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# THE CORNELL ENGINEER



1944

Volume 10 - Number 2

COLLEGE OF ENGINEERING • CORNELL UNIVERSITY

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# The CORNELL ENGINEER

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Cover: H. B. Curtis at work on a wind tunnel.

Frontis: Machining a low pressure spindle for the power plant of  
a victory ship.

—Courtesy Allis Chalmers

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# THE U.S.S. DOLPHIN IN SEARCH OF A STORM

By DR. W. F. DURAND

*Former Acting Director at Sibley College*

THE birth of our modern steel ship Navy goes back to the decade 1880-1890. A start was made in the Garfield-Arthur Administration (1881-1885) through the authorization by the Congress, with a suitable appropriation of funds, for the construction of four steel ships as proposed by the Navy Department. These were the cruiser Chicago of about 5,000 tons displacement, the two smaller cruisers Boston and Atlanta of about 3,000 tons, and the despatch boat Dolphin of about 2,000 tons. This latter craft was something of a non-descript in naval warship design—a cross between a yacht and a very small cruiser. She was intended for service as a flagship for the admiral of a fleet, and for prompt contact with and between the several units of a fleet, all as occasion might require. She had a minimum of offensive armament—two saluting howitzers and two 37 mm Hotchkiss rapid-fire guns.

The smallest of the four ships under contract, the Dolphin was naturally the first to be completed by the contractor, John Roach & Sons, of Chester, Pa. This was in the early years of the first Cleveland administration. From the first, some adverse criticism had been directed against the Dolphin, especially to the question as to the significance of a vessel of this character as an element of the fleet. The fact that the Dolphin was designed and contracted for under a Republican administration, while it was completed and came up for acceptance in the early years of a Democratic administration, tended to give a political flavor to the controversy which raged about this small vessel. Promptly following the report by the contractor of the completion of the Dolphin, a board of survey and inspection was appointed to exam-

ine the vessel and report on her fitness for naval service.

## Board Finds Flaws

This Board, composed partly of naval officers and partly of civilian experts, made a minute and searching examination of the ship and of her plans and specifications. The report was definitely hostile listing by the hundreds minor points such as scratches or mars in the paint, splinters in the deck planking, incomplete filling of cracks with iron putty, etc., criticism of space arrangements and general purpose, together with two grave charges:

- (1) The ship would not be able to reach or maintain the contract speed.
- (2) The design indicated structural weakness and the ship would be in hazard if exposed to the buffeting of a heavy seaway.

The details of this report soon became publicly known through the

press, and almost over night the Dolphin became a political issue—defended on the one hand and ridiculed and criticized on the other.

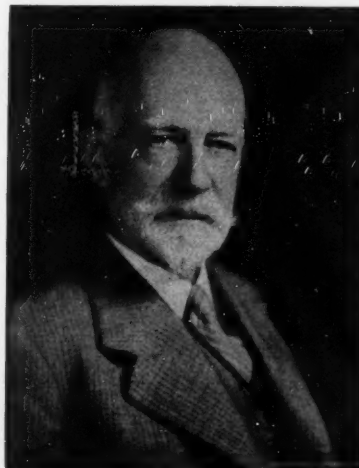
In the face of this situation, acceptance of the ship was refused, and all payments to the contractor were held up, thus forcing him into bankruptcy. Under these conditions it became necessary for the Navy to step in and carry to completion the remaining work on the other ships. As a result of this situation, the writer found himself ordered, in the fall of 1885, to the Morgan Iron Works in New York City (a subsidiary of the Roach Company), for duty in connection with the completion of the motive machinery for the Boston and Atlanta.

Here, one day in November of that year, as I now recall, I received from the Navy Department, Washington, a telegraphic order detaching me from my duty at the Morgan Iron Works and ordering me to report at the U. S. Navy Yard

## THE AUTHOR

In 1880 Dr. Durand graduated from Annapolis at the age of twenty-one. He came to Cornell in 1891 and established the Graduate School of Marine Construction. He became Acting Director of Sibley College in 1903 but resigned in 1904 to head the Mechanical Engineering Department at Stanford.

Dr. Durand has often been called the "Dean of the Engineering Profession" because of his prolific and diversified accomplishments in engineering research. His outstanding efforts have resulted in the presentation of more than two hundred papers before societies in the fields of aeronautics, mechanical engineering, naval architecture, and marine engineering.



Dr. Durand

in Brooklyn for duty on the Dolphin. In naval custom, a telegraphic order means "drop everything and run." Accordingly I went immediately over to the Navy Yard and to the Dolphin, tied up at the wharf, where I found the Commanding Officer, Captain Richard W. Meade and most of the officers assigned to the ship.

#### Orders

Captain Meade invited us into his cabin and there told us the character of our mission substantially as follows:

"Having occasion to be in the Secretary's office on matters having no relation to the Dolphin, I found the Secretary (Wm. C. Whitney) exceedingly irritated over the question of what disposition to make of the problem presented by this situation. He did not feel that he could accept the ship under the adverse report of the committee of experts charging, among many other things, structural weakness. At the same time, the newspaper publicity and the extent to which the question of the Dolphin was becoming a political football created a situation disturbing and irritating to the Administration." "So," said Captain Meade, "after listening to the Secretary talking along these lines for a time, I said to him: Mr. Secretary, of course the Dolphin is not a suitable command for me,\* but if you will give me my orders, I will take the Dolphin out to sea, we will hunt for a storm, and if we do not come back, you may conclude that the Dolphin was structurally weak. If we do come back, it will be another story. 'Captain Meade,' said the Secretary, 'you shall have your orders.' So that is our mission, to test the structural strength of the Dolphin under storm conditions." With that terse characterization of the purpose of the cruise ahead of us, we were dismissed, and the work of taking on provisions and supplies went on apace.

#### Trial Run

Finally, one afternoon in November of that year, all things were ready, and we were informed that we were to make a speed trial run from Newport, Rhode Island (where we had gone for part of our

outfitting) to the Capes at the mouth of the Chesapeake Bay. Under full power we headed for the capes of the Chesapeake. Everything about the ship and her motive power, equipment, etc. worked smoothly and effectively, and we arrived off Capes Charles and Henry late the following afternoon, having made our contract speed of 17 knots with a fraction of a knot to spare.

We assumed then that we might put in between the Capes and proceed up to the Norfolk Navy Yard for the night. But not so. There were weather reports of a heavy blow off Cape Hatteras, and we turned to the East and South and headed for the center of the storm. We arrived off Cape Hatteras early the next morning and found there a storm with strong wind and heavy seas—an ideal condition for the test contemplated. We were informed that the test would comprise 2 hours steaming full power ahead into the sea; 2 hours with sea coming about half-way between ahead and abeam; 2 hours abeam; 2 hours off the quarter; and if it seemed worth while, two hours running from the sea. This program was to start at 8:00 a. m. As junior engineer officer of the ship, it chanced to be my watch from 4:00 to 8:00 a. m. and hence my duty during the watch to bring everything about the boilers and engines into readiness for the grand test to begin at eight o'clock.

Accordingly with full steam pressure in the boilers and throttle wide open at 8:00 a. m., we charged full power ahead on into the raging seas. For most of the next two hours the forward part of the ship was pretty well under water. Great waves swept over the bows and surged aft along the deck. I recall that a full headed-up barrel of pork standing forward was picked up and hurled aft along the deck like a missile from a 24-inch gun. Luckily no one was in its path.

Finally, just a few minutes before ten o'clock, an extra heavy sea engulfed the entire forward part of the ship, mounting up over the command bridge and the pilot house rising from the bridge. Captain Meade was standing in the pilot

house door, and the wave just neatly swamped him up to his eyes, with a dose of salt water in his mouth. The executive officer (second in command) was standing on the bridge gratings with his hands on the brass rail in front. The sea unshipped these gratings from their supports on the bridge girder and left Mr. Executive with his legs and body dropped through the opening, but still clinging like an acrobat to the bridge rail.

#### Tests Completed

As soon as the captain could get rid of the salt water in his mouth he barked an order to the man at the wheel for reduced speed, and word was then sent to the engine room that the remainder of the test would be run as per program, but at about  $\frac{3}{4}$  power instead of full power. This was carried out with the omission of the run from a following sea, and so late in the afternoon the tests were considered completed, and we turned North for the Capes of the Chesapeake, finally reaching the Navy Yard at Norfolk, Virginia the following day.

During the entire run in the Hatteras storm there was no sign whatever of structural weakness in the ship. Not a rivet started; no leak developed; no crack gave evidence of incipient failure. So far as the seaworthiness of the ship was concerned, the score was perfect.

#### The Inspectors

In another direction, however, there did develop evidences of extreme weakness. A board of three civilian experts in structural engineering had been asked to make the run on the ship for the express purpose of observing behavior under stress of the high seas and especially of noting and reporting upon any evidences of weakness in the structure of the ship. With the beginning of the run and the consequent behavior of the ship, these gentlemen retired promptly to their quarters and we saw nothing of them during the test. Whatever

(Continued on page 34)

*\*As a high ranking Captain, Captain Meade would normally be given the command of a heavy cruiser or a battleship, had there been such a unit in our Navy at that time.*

# ARMY ENGINEERS, THOUGHTS AND DEEDS

By COLONEL CARLTON S. PROCTOR

*Text of an address given last spring before the Cornell Society of Engineers*

*All photos courtesy United States Army Signal Corps*

**M**ORE and more people are asking military men returning from overseas what our boys are thinking and worrying about most. I'm glad they do, and I'm glad to answer because the answer may be the key to our most pressing national problem and because I feel that I got to know the men in my regiment pretty intimately. Training a new regiment for 5 months and then directing them on a tough assignment in as tough a location as the Persian Gulf is conducive to a pretty good knowledge of the character of the men you're working with.

My regiment reached the Persian Gulf when the Nazis were furthest advanced in North Africa and into Russia. Here, and later in an Army General Hospital outside of Cairo, I knew many, many G.I. Joes. I never met one who showed the slightest fear of personal injury or even death, or one who was really worried when the bad news came in daily of more German victories that threatened Alexandria and the loss of the Caucasus. But everywhere I did find a profound fear of what was happening on our own home front.

And since my return and retirement, I have found many evidences that the fears of our Armed Forces as to the home front may be justified. For the G.I.'s fears boil down to three main points, which I think you'll agree are matters of serious consideration.

## Home Front War Weariness

First, the G.I. fears home front war weariness which may lead to another premature armistice. The spectre of our failures to secure the peace after the last war, the total absence of an allied post war coali-

tion and the consequent loss of all that had been fought for with the inevitable resumption of war in a mere 20 years is a constant nightmare. Neither a crippling injury nor death is what these men fear, but the futility of injury or death without the accomplishment of a permanent peace and the attainment of the principles they are fighting for. These men feel, and I certainly agree with them, that home front talk of an early peace is a definite 5th column activity and should be opposed as strenuously as any other sabotage.

## Home Front Complacency

Second, the fear of home front complacency, self-satisfaction and overconfidence. Because American industry and labor did such a stupendous job in mobilization for war, too many feel that our home front job is done, that from now

on it's all up to the Army and Navy and Government. This probably is the most dangerous attitude that the American public can take. We must not forget that mobilization for war is definitely in the American tradition and exactly what any student of American History should have expected, whereas the more tedious and less glamorous mobilization for peace is definitely contrary to our National tradition. We will again face confusion and visionary programming when this war is over, unless we all recognize that the real test of the Nation's strength must lie in our ability to now fully mobilize our whole peoples for peace.

And this all leads naturally to the third G.I. fear, that is, his fear regarding post war employment. But, you say, why should they have that worry; hasn't every community, state and federal bureau a commit-

## THE AUTHOR

Colonel Carlton Springer Proctor attended the University of Maryland and Princeton University, where he received his Civil Engineering degree in 1915. Since then he has worked as a consulting engineer in New York City for the New York American League Stadium, Trans-Bay and Golden Gate Bridges, many U. S. Navy shipyards, and numerous similar projects.

Colonel Proctor served as a construction officer in World War I and recently returned to this country after commanding a Special Service Engineers Regiment overseas during the present war.

He is widely known as a technical author and lecturer.



*Photograph by Fabian Bachrach*

**Colonel Proctor**



tee on post war employment of veterans? Yes, but there is a basic flaw in every such plan that I have seen, and that is the fact that they are all defensive, not offensive; they all seem to be based on the philosophy that this war and the conditions which we will obtain after this war are comparable to those of the last war. Nothing could be further from the facts. Whereas the last war provided a type of experience directly opposed to the demands of civil life, this war is providing experiences by the thousands most conducive to success in civil life. Whereas in the last war the services were entirely unprepared and possessed no adequate machinery for personnel selection or evaluation of previous experience, aptitude, or training, at the outbreak of this war the services were thoroughly prepared with magnificent, carefully developed training programs and a highly scientific and workable system for personnel selection which took full advantage of latent abilities, previous training, and special aptitudes, with the result that all were trained to limits of their capacities. Whereas the military demands of the last war were such that personal initiative was discouraged as being frequently dangerous to a man's outfit, in this war personal initiative is encouraged and developed to the highest obtainable degree. Whereas after the last war, in many, many cases industry could not afford the cost,

loss of efficiency, and risks of readjustment necessary to the reinstatement of returning veterans, after this war industry cannot afford to miss the opportunity for the employment of veterans who will have so very, very much to offer to its success and technological advancement.

#### Best Training

There was no impatient enthusiasm on the part of the American youth to enter this war but an intense seriousness and a general conviction that we and our generation, not they, were responsible for the present situation, in that we had only done a half job and while winning the war had definitely lost the peace.

When this generation was drawn into the war, they found the services ready to receive and train them so that after only weeks of training we could barely recognize our own sons. Their enthusiasm and pride of membership in the Armed Forces grew with their realization of their newly found and newly developed power and initiative. There is no question in my mind but that we have the finest trained army and the best training procedure of any army in the world. Certainly, in no other army do you find an equal pride and attitude of self-assurance.

But, of most importance is the basic difference that for this war each man is taught self-reliance



Radiomen operate an SCR-193 during an invasion.

and self-discipline, and his initiative and ability for independent action are developed to the highest obtainable degree, because in this war nothing is static; battles are frequently won by quick action and initiative, and important tasks often fall to small groups.

Let me take my own regiment as an example of the type of men we are going to have the opportunity to work with after this armistice. This regiment was in the first group of engineering regiments activated from civil life and was one of the first two special service engineer regiments. Men from every state in the union made up this regiment, from all walks of life, a typical cross-section of American youth. Early in the training the selections started for specialist training and specialist schools. When we left for overseas we comprised a regiment of thoroughly trained experts and specialists, and when we arrived we put through a difficult construction program. Complex engineering and construction equipment was being efficiently operated, maintained and repaired; complete machine shops were being operated; large groups of native labor were being directed and all of the military duties were directed and integrated—in many, many cases by men who a few months before had been in entirely different or far less skilled occupations. In civil life, under our apprentice system, such results would have required years instead of weeks and months, and many would never have had the opportunity to

Tool and bench truck out in the field used by maintenance crew to make repairs.



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receive this splendid training.

These men came in green, unenthusiastic and skeptical — there wasn't any question about that, and inside of weeks there emerged a thoroughly well-integrated military unit of which every man was proud. Their transition from green boys to soldiers was one of the most remarkable experiences I have ever known.

Through five months of training they had not only the normal military training, not only the normal combat engineering training, but insofar as possible training on special engineering, reconnaissance and demolition problems such as they might meet overseas.

### Persian Gulf

My regiment landed in the Persian Gulf as the first contingent of Construction troops to arrive there. They landed in the rainy season, mud quite deep, conditions generally about as unattractive as you can imagine. They sang on the way as they marched from the dock up to where their tents were pitched in mud ankle-deep, and although the rain continued every day, the next day and the next day you could see the change, and inside of two or three days those company streets and that whole area were drained and lighted and were sanitary. Kitchen facilities had been installed, and those fellows were ready to go to work. They tackled a road that had to be built through a desert of silt, the soil material which was, until comparatively recent historical times, a part of the bed of the Persian Gulf. They tackled that job including the job of building a new port at Khorramshar, a job of building with inadequate facilities, inadequate and improper materials, (for the first two weeks inadequate food when we lived on British rations because our rations had not arrived) and they did their jobs with a spirit such as I have never seen.

### Target Met

We had a target for the opening of that road which on any analysis was impossible. It didn't take an engineer or a construction man or contractor to look at that situation and that mud and that rain to say "that target is impossible," but it

was accomplished. I had a job of no mean proportion in trying to keep these men, down to the last private, from working themselves to the point where they couldn't do their job. I don't remember of any case where I ever had the job or responsibility of asking men to speed up, but I do remember many cases of finding men who hadn't changed their clothing or left the job for 36 hours. They had a target set and each one of them took it as his own personal responsibility to see that that target was met, and it was met. Trucks rolled over that road on the date originally set regardless of weather.

I have spent my entire life, since graduation, in heavy engineering, but I have never seen anything to

the last war situation where they came back ill-equipped for any job.

Senator Russell in his report to the Senate on his war area inspection says that one of the benefits of this war will lie in the training of large groups of the finest craftsmen and mechanics in the world. "Boys who twelve months ago were either unemployed or doing work requiring no skill are today repairing the most delicate instruments, such as radar and radio equipment, telephone exchanges, submarine periscopes, and are working with the countless finely balanced machines which are necessary in the operation of airplanes, submarines and other complicated mechanisms of war." Now these men and women will come back to civil life better



This mortar crew keeps pounding the Germans with 61 mm mortar fire on the front lines.

equal the loyalty, the toughness, the guts and the ability of this crowd. Bear in mind that this is just a typical regiment. I am not trying to build up or paint an overbright picture of one particular regiment. I don't believe it was any different from many other engineering regiments, and other regiments may have been better trained because of improvements in training programs and facilities. What I am trying to say is simply this: Out of this war are going to return men who can do their job, and that covers the whole field and the whole swing, better than comparable men in the same job back home, as opposed to

trained and more efficient than many of the artisans and mechanics now doing similar civilian work. And so in every branch of the Army, Navy and Marine Corps men by the millions will return, especially skilled for civilian occupations, trained on a basis of efficiency, teamwork and speed never before dreamed of, eager for and demanding their places in the reconstruction, modernization and civilization of the post-war world.

I conscientiously believe that these men as a group are coming back on a basis that is going to put to the best test those of us who have

(Continued on page 30)

# MIGHTY MITES OF INDUSTRY

By L. R. ANDERSON, EE, V-12

*All cuts courtesy New Departure.*

**T**HE fight against friction in moving parts has been carried on since man has been on the face of the earth. Man won his first victory over friction when he discovered that it is easier to roll a log than to drag it. This, however, decreased friction in only one direction; and, if man wished to move the log endwise, he needed to devise some other means of combating friction. He later discovered that if a spherical object of some sort were placed under the body to be moved, this body could be moved in any direction with equal ease. This was, in essence, the first ball

upon a shaft, and the outer ring is secured in a housing, the shaft will revolve upon free rolling balls. A bearing constructed in this manner is one of the most friction free contacts available. For this reason modern industry depends upon the ball bearing to reduce friction in most precision and high speed machinery. Second only in importance to its friction free contact, is the interchangeability of the modern ball bearing. When a ball bearing wears out, the user need only order another bearing from the same company or look in his interchangeability table and get a similar

When a tank over in Italy or Germany burns out a bearing, another bearing of the same size is merely requisitioned and slipped into place. Without the modern ball bearing, automobiles, machine tools, airplanes, and countless other modern innovations could not have reached their present state of efficiency. In contrast to the few sizes available in the early 1900's, ball bearings today are available in a very large range of types and sizes. In some large machines, the bearings may be as large as five feet in diameter. In surgical and other small instruments, bearings are used that are as small as one sixteenth of an inch, outside diameter and one thirty-second of an inch, inside diameter. These small bearings are assembled by watchmakers and are lubricated by hypodermic needles.

## Manufacturing Processes

Ball bearings are made of a high carbon chrome alloy steel. The steel is refined in electric furnaces and is the cleanest, purest steel now possible to make. For the manufacture of balls, the steel is made into rods or coils of wire. This wire is annealed, descaled by rolling and pickling, and then drawn through carbon tungsten dies to achieve smoothness and roundness in the wire. The wire is cut up into short slugs which are hot or cold pressed into rough spheres. This process sets up internal stresses which are relieved by normalizing in special furnaces, after which the balls are allowed to cool in still air. The balls are ground down by being held against the side of a grinding wheel with a pressure plate. The principal of this operation is similar to that of rolling a piece of putty between the hands. The rough grinding finishes the balls to a few thousands of an inch out of round



Operating at high-speed in precision work, this bore grinder illustrates use of ball bearings in continuous production at 18,000 r.p.m., which would burn up any but the finest bearings.

bearing.

The present ball bearing, which is a highly perfected development of this first application, is made of two steel rings, one held within the other by steel balls which roll in grooves on the rings and are kept in place by holders called separators. When the inner ring is fixed

one from a different manufacturer. This is taken for granted today; but one must remember that back in the early 1900's the development of mass production was retarded because every bearing had to be fitted individually into place. If this were true at present, modern warfare could not be carried on.

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and quite a bit oversize.

To withstand the heavy forces applied while in use, the balls must be very hard and shock resistant. Careful heat treating is required to achieve this. The balls are heated to above their critical temperature and quenched. The quenching medium is carefully controlled because consistent hardness can be obtained only with a constant rate of cooling. After cooling, the balls are extremely hard and brittle; so they are tempered in electric furnaces to relieve stresses from the hardening quench and to increase toughness at the slight expense of hardness. In the next operation, finish grinding, the balls pass between two plates, one of which has spiral grooves so that the balls move gradually outwards. A mixture of oil and fine abrasive is added to bring the bearings almost to a finished size. The next step is similar except that soluble oil, water, cutting compound, and unfused alumina are used instead of an abrasive. When the balls are ground down to the right size, they are polished with leather slugs and rouge in tumbling barrels. The balls are then inspected for surface defects by rotating them upon a white background. This affects the surface light upon the ball, so that otherwise invisible defects become visible to the naked eye. The balls are sorted into lots that do not vary in size beyond certain specified limits and are sent to the assembly department.

Steel for the rings is usually sup-

plied in long bars. For the common size rings, these bars are heated and upset forged into the rough shape of the ring. The operation of forging is an important one in giving the ring strength. Metal, like wood, has grain flow. When a ring is forged, no steel is removed. Instead a punch is gradually forced through the bar to make the bore. Thus the directional flow of grain in the steel remains unbroken and flows in circles around the bore. If the ring were machined from a bar and the bore drilled out, the flow of grain would still be straight across the ring. The hole bored through the center would cut across the grain and greatly weaken the finished product. After the forging is completed the rings must be softened before they can be further finished. This is done by an annealing process, in which the steel is heated to high temperatures and cooled slowly in closely controlled furnaces. This operation refines the grain structure of the steel and relieves stresses due to the forging but does not destroy the directional flow of grain secured by forging. After machining, the rings are hardened by heating and quenching. Following the hardening, the rings are ground in several operations. Between each of these grinding operations, they are washed in special solutions to remove foreign particles

and prevent corrosion. The rings are brought to the right size by a lapping process using a very fine abrasive, after which they are polished to give the desired finish.

The separators for ordinary bearings are usually stamped from steel. In some of the high speed bearings, however, a Bakelite compound ball cage is used which is superior to the stamped steel separator. The material is made by winding fine linen around a mandrel, and then impregnating the linen with a Bakelite solution. When this combination is baked and seasoned, the resulting material is not only light in weight; but has a tensile strength of 40,000 pounds per square inch with the grain. The absorbent fabric of this separator fills with oil and gives additional lubrication. The Bakelite takes a high polish and offers a very friction free surface to the balls. The separator is treated with hot oil for durability.

Since ball bearings are precision devices, every one of their dimensions must confirm to very close tolerances. During their manufacture, all parts are constantly checked by precision measuring instruments. By means of inclined steel straight edges, balls are sorted into lots which vary no more than five one-hundredth of an inch from stipulated limits. When the rings

*(Continued on page 36)*

*Right—Under corrosive conditions—Comparison of ordinary and self-sealed bearing after use in refrigerator trolley, shows that proper ball bearings can lengthen life appreciably.*



*Below—In transportation—On sea, as well as on land and in the air, the ball bearing has made possible the attainment of higher and higher speeds.*



# Engineering At Cornell

## I. Materials Processing

By RICHARD GOLL, M.E., V-12

**T**HE Materials Processing Department, a longtime favorite among most freshmen and sophomore, mechanical, civil, and electrical engineers acts as a practical application for the theory learned in other engineering courses. This department can be roughly divided into four main divisions: the wood-working shop, under the direction of Messrs. Curtis and Yawger; the foundry, directed by Mr. Patterson; the machine shop, run by Professor Geer and Mr. Mack; and the metal working shop, supervised by Messrs. Hill and Morgan.

### Purpose of Department

These four divisions are arranged so that they form a close network with interlinking ideas and motives. Perhaps the main motive in this

department is teaching the student to meet and solve practical problems of material fabrication. Various projects are worked upon in Rand Hall's wood and machine shops, and in the foundry, and metal working shop across the street. Many of these projects are introduced in such a manner that the student starts with a rough piece of wood and ends with a finished machined product. The steps in between form the basic framework of the Materials Processing Department.

The rough piece of wood starts its transformation on the 3rd floor of Rand Hall. Here Mr. Curtis and Mr. Yawger, assisted by Mr. Patterson, give the students lectures and demonstrations which lead to a better understanding of pattern-

making. Before the student picks up a tool, he has a fairly clear idea of what he is going to do and why. Even during the actual work on the project, jovial Mr. Curtis or helpful Mr. Yawger are at hand to give useful hints.

### Lecture Period

Although the lectures are planned in advance, the class usually becomes a bit drowsy toward the end of the long period. This is the reason why Mr. Curtis ends his lectures ten minutes ahead of time. It allows him time to go through the class and awaken everyone. Sometimes the lectures are supplemented by slides. The "Rube Goldberg" slide machine is operated by Charlie Patterson. It is not unusual to have several of the slides projected on the screen upside-down. This is obviously done to preserve the "Nickelodeon" atmosphere.

The next step on the project takes place in the foundry to the rear of Sibley. The foundry building itself has not changed greatly in recent years, but Charlie Patterson remembers 30 years back when things were radically different. A slide showing the foundry at that time is Charlie's favorite, and he proudly displays it to every class with a "I remember when—". Every student has the opportunity to hand-ram a mold as well as work on the molding machines. The machines occasionally offer some difficulty in operation, and even the instructors themselves may run into trouble. Once Mr. Curtis had a very interesting experience in operating one of the jar roll over and draw machines. The device was stuck and Mr. Curtis was investigating the difficulty when the roll-over arms suddenly swung the mold up past Mr. Curtis' nose and over

Mr. Hill instructs Curtiss-Wright "cadettes" at the art of "metal-bending" in the forge shop. These girls are no longer training at Cornell, but similar forging projects are given to current students.



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to the other side, gently removing a pencil from his pocket and tipping his cap to the back of his head.

Charlie says that grading and sifting sand are important phases of foundry work, and Mr. Curtis presents several lectures to prove it. It is probably from this sand work that the nickname of "Dirt-Pitching" has come into use as a synonym for the course.

Toward the end of the term the cupola is charged and the famous "heat" is undertaken. Word is given out during a lecture: "Next Saturday morning the Foundry Department will present its first heat of the year. Mr. Patterson will pour."

### Pouring of Metal

Everyone who participates in the operation of pouring and handling the molten metal dons boots, hats, and goggles for protection. This, in addition to the white hot liquid metal, creates a weird scene. A certain feeling of tenseness hovers over the class as the first metal is drawn. Mr. Curtis mixes with the students giving words of reassurance, but it is clearly evident that even he is uneasy, as is witnessed by the fact that he forgets to pull his goggles over his eyes when they should be in position. Charlie Patterson acts as "foreman" (a name rarely used here now, but common when Charlie first came to Cornell) and sees to it that everyone is working in the proper manner. He braves the shower of sparks spurting from the mouth of the cupola to remove the clay plug and sometimes receives applause of admiration from by-standers behind the ropes.

Messrs. Yawger, Patterson and Curtis (left to right) demonstrate a molding machine to prospective engineering students at the annual Engineering Show given before the war. Sand molding is an essential part of foundry work.



—Photo by R. C. Reese  
Students group around to watch a demonstration of arc-welding in the forge shop. Shields are for protection against glaring light and flying pieces of hot metal.

### Machining Project

After the metal cools and the molds are knocked from around the pieces, the project, now a casting, returns to the Rand Hall machine shop. Prof. Geer and Mr. Mack take over here. At the offset of the term, the student chooses his own lathe and is stuck with it until he has completed the course. He is required to make a complete mechanical drawing of his own lathe, so that he may have a more complete understanding of its operation. This drawing is due at a specified date near the beginning of the term, and sometimes the student is pinched for time. The

latter problem has at times been solved by just erasing the previous owner's name and inserting the present user's name. Sometimes this continues until a hole is worn in the title box.

### Safety-first

Large quantities of power are available in the Machine Shop; so the idea of safety-first is continually impressed upon the student's mind. Prof. Geer and Mr. Mack should be congratulated on the excellent work that they have done along this line; however, accidents do happen and queer things frequently result. One day a fellow who had his work set up and running smoothly in the lathe rested his hand on the lathe bed as he dreamily looked out of the windows at a beautiful co-ed. He was so surprised to see such a creation that he did not realize a moving part had cut a slit right down the middle of his finger. Not until he observed a pool of blood collecting at his feet, did he snap out of it. He went running to Mr. Mack shouting, "How did that happen?" (meaning the co-ed, of course).

One thing that impresses a visitor to the shop is the teamwork of

(Continued on page 26)





—Photo by Stan London  
**Johnny**

### John Casazza, EE

HAVING shown a great scholastic aptitude in high school, it was only natural that John Andrew Casazza should decide to attend a university. His natural ability in mathematics coupled with his liking for technical subjects and his especial interest in electricity seemed to point to taking electrical engineering at a technical school. After looking over the various institutes, he chose a college near his home town of Brooklyn, the Cooper Union for the Advancement of Science and Arts, in New York City.

Johnny has the distinction of entirely supporting himself through college. Being interested in medicine, he worked after classes as a medical assistant to a doctor. During summer vacations, he satiated his love of the out-of-doors, while earning money, by working on an apple farm.

Johnny was very active in sports during his stay at Cooper Union from 1941 to 1944. Although intercollegiate sports were curtailed by the war, he participated in all of the intramural sports, and was captain of his basketball, football, and softball teams.

In October 1943, after completing five terms at Cooper Union, he enlisted in the Navy, and in March 1944 was assigned to the Cornell V-12 Unit. Since he has been here, Johnny has received many scholastic honors. He has been elected to Eta Kappa Nu, Electrical Engineer's Honorary Fraternity, and he has been awarded a Hiram W. Sib-

# P R O M I N E N T

ley Scholarship Award. He is also a member of the American Institute of Electrical Engineers.

Johnny has been active in all Navy intramural sports since he came here. In addition to playing on the football, softball and ping pong teams, he was athletic manager for his dormitory last term. The title of sports expert has fallen to him, and it is reputed that he knows the rules and history of every organized sport. Although Johnny modestly says that almost every sports argument ends in his finding himself in error, all the fellows in his dormitory come to him for the solution when a dispute arises.

Another of Johnny's abilities manifests itself in his arriving first in the chow line every day, and for this marvelous feat he claims the title of champion chow hound of his dorm. At the beginning of every term he has picked a protege and started to teach him the subtle lore of the chow hound. Soon, however, having always become disgusted with his pupil's inability to absorb the art, he has become a lone chow wolf once again. At present it appears that his secret of success will go with the master when he leaves Cornell.

Johnny will graduate from Cornell with a BEE in Electrical Engineering, Power Option, in March and will enter Midshipman's School soon after that. After receiving his commission, Johnny hopes to be assigned to carrier duty.

His post-war plans are rather vague at present, but he thinks that he will try to secure a university instructing position. His blueprint calls for a little farm with a couple of chickens, a wife, and a couple of children to come home to at night.

### Alex Drogin, CE

ONE night in May 1943 a group of Cornellians gathered at the Ithaca station to say farewell for the duration to their good friend. The departing friend who had enlisted in the Marine Corps 'to do my fighting bit' was Alex Drogin. He had

received his orders to report for active duty on July 1, 1943. The few days that remained were spent at home in Bayonne, N. J., where Al was born and raised. Then on the first he reported for active duty and was assigned to the Marine V-12 Unit at Cornell University.

Though this wasn't exactly what he had expected, Al was glad to have the chance to continue his college education which he had started in Cornell's School of Civil Engineering. When we inquired how he happened to choose Cornell, Al said he felt that here he could get the best foundation for Civil Engineering, a profession in which he has always had a great interest.

During his first year here, Al played Frosh football. This might logically be expected from the three-letter man (baseball, basketball, and football) that he was in high school. Alex joined Tau Epsilon Phi and in his Sophomore year acquired the positions of Treasurer and captain of the athletic teams.

Between terms Al worked at Western Electric inspecting structural forms. Returning to school, he made the Rifle team, which ranked high in Intercollegiate competition, and became a member of the A.S.C.E. Alex also went out for football of the varsity variety,

(Continued on page 34)

Al



**THE CORNELL ENGINEER**

# ENGINEERS

## Bryce MacDonald, ChemE

"THE last of a vanishing race—that's me," mused Bryce MacDonald as he put his feet on his desk and looked out the window of his office in Olin 108. "Yep," he continued, "when I started Chem E back in October of 1941 there were one hundred sixty of us, and now—well, you're looking at the class of '45."

So we sat and looked at the remnant of the class of '45, and despite nine terms of Chemical Engineering, we found it pleasant. About average height and build, with sandy hair and a whale of a personality, Mac is one of the best party boys on the hill. Mac probably knows as many college songs, both co-ed and stag verions, as anyone on the campus, and it doesn't take too much encouragement or too many beers to get him to lead a crowd in practically any song from the Alma Mater to "The Good Ship Venus".

But college hasn't been all a song; besides keeping up his average in the rough Chem E school, Mac has worked for his meals since freshman year and claims, without reservation, to be "the best all-around, open-field, free-style pqt-scrubber on the campus." The only summer Mac has had free-

Mac



since coming to Cornell was spent working for the Bakelite Corporation in Boundbrook, N. J., not far from his home at Westfield.

MacDonald has been active in many extra-curricular activities since coming to Cornell. He's one of the two members of Phi Kappa Tau Fraternity left on the campus, and he's battling like mad to keep his fraternity alive. Elected to Al-Djebar in his junior year, Mac now heads that honorary Chemical Engineering society. In addition, he is President of the student chapter of the A.I.Ch.E., and since 1943 he has been assisting in Chemical Microscopy and Unit Operations Laboratory.

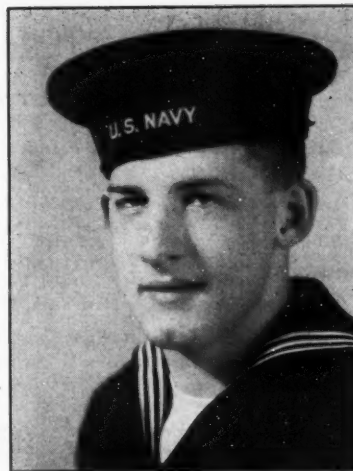
When asked why he chose Cor-  
(Continued on page 34)

## Harold Faught, ME

"My ambition is to retire." Leave it to the top man in the eighth term of the Mechanical Engineering school to make such a statement. However, knowing Harold Faught, if that is his aim, it will be accomplished with as much success as anything he has undertaken in the past.

"Hal" Faught has been calling Washington his home ever since October 16, 1924 when he began his life of notable activities. His greater accomplishments were begun at the University of Maryland where he had his first two years of engineering. While there he was made a member of Pershing Rifles, and Tau Beta Pi pledged him as a member although he was not initiated until he came to Cornell as a V-12 last year. The Cornell Student Branch of ASME and Atmos also claim him as a member.

This last term of Hal's is rather unusual. He is taking his last two required senior courses, and the rest of his schedule consists of back courses in Foundry, Measuring Instruments, and Accounting. The bane of his life is having to write two Mech Lab reports a week, although he enjoys the lab work very much. He does feel that the Ex-



Hal

perimental and Testing departments of Cornell are outstanding.

One of Hal's summer vacations (back in the days when he had them) was spent as a government typist, and another summer was spent in a small airplane factory. In the non-working hours of those days, Hal enjoyed aquaplaning behind a speedboat in the waters of the Potomac River. One time he tried to stand on his head, but that was the beginning and the end of his fancy aquaplane stances.

Although Hal is a "dry-land" sailor, he has a natural background for Navy life. One of his hobbies is boat-building. He and his friends built an eighteen-foot speedboat with a 4-cylinder Model A engine one year. Much to his chagrin he could not tell me how many knots the boat made.

Hal has been quite interested in Diesel engines, and he hopes to work on them when he enters Midshipman's training. He has thought seriously of returning to Cornell after the war to take another year of engineering. The new five-year course appeals to him, and he believes that engineers should round out their educations. Music, dancing, and good books are among his spare-time pleasures, although he does not play any musical instrument.

As a final word here is a tip-off to the game wardens of the state of Virginia: This is the man you are looking for; he is the guy who used to hunt without paying for the \$15.00 out-of-state hunting license.

# Cornell Society of Engineers

107 EAST 48TH STREET

1944-1945

NEW YORK 17, N. Y.

BERNARD A. SAVAGE, *President*  
171 — 85th St., Brooklyn, N. Y.

J. PAUL LEINROTH, *Executive Vice-President*  
37 The Fairway, Montclair, New Jersey

PAUL O. REYNEAU, *Secretary-Treasurer*  
and *Representative Cornell Univ. Placement Service*  
107 East 48th St., New York, N. Y.

WILLIAM M. RECK, *Recording Secretary*  
374 N. Fullerton Ave., Upper Montclair, N. J.

FURMAN SOUTH, JR., *Vice-President*  
1140 Wightman St., Pittsburgh, Pa.

WILSON S. DODGE, *Vice-President*  
327 Montgomery St., Syracuse, N. Y.

GORDON J. MERTZ, *Vice-President*  
540 Shoemaker Rd., Elkins Park, Pa.

CARLETON REYNELL, *Vice-President*  
253 Forest Ave., Glen Ridge, N. J.

*"The objects of this Society are to promote the welfare of the College of Engineering at Cornell University, its graduates and former students and to establish a closer relationship between the college and the alumni."*

## President's Message

**N**OTWITHSTANDING the amazing exploits of the Allied Armies and Navies in the European theatre of war as they shatter the myth of German invincibility and domination, the cold hard facts are that this phase of the war may well continue into the spring of 1945, and the Japanese war for several years thereafter. The officers of your society are apprised of this and, accordingly, plans are being made to increase the usefulness of the society to both the University and our engineering alumni during this period. The first move in this direction was made in the selection of the society's executive committee whose duty it will be to insure these objectives. The members of this committee are as follows:

Bernard A. Savage, President,  
171-85th St., Brooklyn, N.Y.  
J. Paul Leinroth, Executive Vice-President,  
37 The Fairway, Montclair, N. J.  
Paul O. Reyneau, Secretary-Treasurer and Representative Cornell University Placement Service,  
107 East 48th St., New York, N. J.  
William M. Reck, Recording Secretary,  
374 N. Fullerton Ave., Upper Montclair, N. J.  
Regional Vice-Presidents:  
Furman South, Jr.,  
1140 Wightman St., Pittsburgh, Pa.  
Wilson S. Dodge,  
327 Montgomery St., Syracuse, N. Y.  
Gordon J. Mertz,  
540 Shoemaker Rd., Elkins Park, Pa.  
Carleton Reynell,  
253 Forest Ave., Glen Ridge, N. J.

The Executive Committee of the Society, however, in addition to the elected officers comprises the following:

1. The three last Past Presidents: George N. Brown, M.E. '08, James Lynah, M.E. '05, the third office vacant through resignation.

2. The following standing committees:  
Regional Sections headed by John R. Bangs, Jr., M.E. '21.

Membership Committee headed by Wilton Bentley, M.E. '98, as Chairman, and Lawrence S. Waterbury, C.E. '19, as Assistant Chairman.

Awards: William H. Hill, M.E., Chairman.

Publications: George T. Minasian, M.E., '18, Chairman.

Meetings: John P. Riley, C.E. '21, Chairman, and Raymond A. Kohm, C.E. '24, Assistant Chairman.

The Executive Committee also includes the following representatives on various Cornell or Cornell Alumni organizations:

1. By virtue of his office your President, Bernard A. Savage, is a member of the Board of Directors of the Cornell Alumni Association.

2. George N. Brown is the representative on the Engineering Council of the College of Engineering.

3. Wilton Bentley has just been appointed as the representative on the Alumni Trustee Nominations Committee of the Cornell Alumni Association, following a revision of its by-laws. Additional members of the Executive Committee are the two representatives from each one of our four colleges of engineering as follows:

Electrical Engineering—Robert B. Lea, ME, '15, and Carl F. Ostergren, M.E. '21.

Civil Engineering—Homer R. Seely, C.E. '19, and L. S. Waterbury, C.E. '19.

Mechanical Engineering—William Littlewood, M.E. '20, and Rudolph M. Triest, M.E. '12.

Chemical Engineering—Henry R. Gundlach, B. Chem. '11, and Karl J. Nelson, Chem. E. '39.

The regional sections elect their own officers, the Chairman becoming one of the vice-presidents of the Society, with authority to appoint such committees that they feel are necessary to carry on the local affairs. An operating subsidy, based on the number of members in each regional section, is furnished by headquarters to assist in defraying their expenses.

This experienced and diversified group of engineering alumni, because of their important and timely contribution to the programs of the Society, will enhance the value of the Society to both the College of Engineering and its alumni. However, without your continued and interested support, the beneficial results of their planning may not reach everyone. In these trying times, your Society needs you, needs your interest and valuable suggestions as to how we can better serve. May I ask you for this cooperation? The dividends will most assuredly be worth your while.

BERNARD A. SAVAGE, M.E. '25.





1. Your telephone in peacetime reaches 95% of the world's telephones and over 26,000,000 in the United States today.



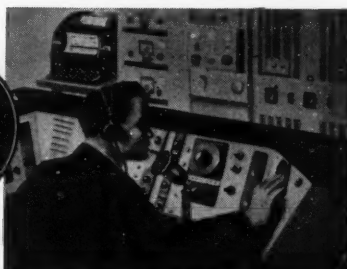
2. You fly with greater safety because of radio telephony between plane and ground—demonstrated by Western Electric in 1917.



3. You ride more safely on the nation's railroads because of Western Electric train dispatching telephone equipment.



4. You hear radio news and entertainment. Since radio began, W. E. engineers have helped build broadcasting equipment.



5. You enjoy added protection today thanks to Western Electric inter-city police teletype, and radio in police cars.



6. You can enjoy talking pictures—made commercially possible back in 1926 by Western Electric development.



7. The hard of hearing can live more fully with a Western Electric hearing aid, perfected through telephone research.



8. You will enjoy television. This picture shows how W. E. equipment sent images by radio as long ago as 1927.

## ...come these contributions to better living

For many years, Western Electric engineers have devoted their skill to the production of telephones and the vast network of telephone equipment used by the Bell System. At the same time they have developed the manufacture of related products which also have contributed materially to better living. Some are pictured here.

Today Western Electric engineers are doing their greatest job—guiding the production of huge quantities

of electronic and communications equipment that help our fighting men win battles—help save American lives—help maintain the vital home front communications networks, and bring nearer the day of final victory and peace.

When that day comes, the men and women of Western Electric will resume their 75-year-old job of making communications equipment to further enrich your life.

1869

1944



75th ANNIVERSARY

**Western Electric**

IN PEACE...SOURCE OF SUPPLY FOR THE BELL SYSTEM.  
IN WAR...ARSENAL OF COMMUNICATIONS EQUIPMENT.



Buy all the War Bonds  
you can—and keep them!

*Dedicated to ye ancient and honourable society of ye chemicale engineers in ye belief that Chemicale Engineering is ye one, ye only art.*

## "Caustic"

By JIM EDISON, ChemE, V-12

WITH this issue we introduce to our readers a new feature page—a page written and collected by the boys down Olin way, and one which we hope will be as well received as Bob Garnezy's "Loose Juice".

Primarily, it will be a page of humor—Gawd knows there's humor aplenty around Olin. Anytime we really want to burst out laughing, all we need do is look at our schedule. We'll try to give you the pick of some of the cherce jokes which continue to circulate around those Midshipmen-infested halls despite the efforts of an individual whose name we won't mention (but whose initials are Dusty Rhodes), and we shall attempt to chronicle the actions of that person whose name we didn't mention. We shall also try to get in print the witty sayings of other members of the "Knights of Olin", either faculty or students, whose wisdom we feel should be perpetuated for the generations to come. So here goes—and well, what the hell, you've paid your buck, you might as well read on.

\* \* \*

The other day a rather enlightening event occurred in front of Olin. A platoon of Middies was waiting to march down the hill when a small boy leading a donkey in the direction of the Vet School passed by. A couple of Middies tried to heckle the kid but got no response until one of them asked, "Say, why are you holding your brother so tightly? Are you afraid that jackass will run away?"

"No," answered the kid, "I'm afraid they might draft him into Middy school." And he walked serenely up the hill.

\* \* \*

I call my gal "Checkers" 'cause she jumps when I make a bad move.

As this is being written, we have on our desk the latest report from the Al-Djebar Committee on Research. After intensive investigation and tireless experimentation, with perhaps the best equipment to be found in any university in the country—if not the world—the committee unanimously announces that nothing improves a pinch of salt so much as a stein of beer.

\* \* \*

We can hardly wait until chemistry advances the painted-on stocking fad until it includes bathing suits.

\* \* \*

Reminds us of the story concerning the small circus which was making a one-night stand in a small southern town when a particularly violent electric storm caused the single elephant to stampede. The next morning the local constable got a call.

"Come out right quick," an excited feminine voice said. "There's a mountain of an animal out in my garden pulling up my cabbages with his tail."

"What's he doing with the cabbages?" questioned the cop.

"You wouldn't believe me if I told you," came the answer.

\* \* \*

Speaking of rural settings reminds us of our old friend Bryce MacDonald. If you're ever introduced to anyone of that name, watch him. You see he lived on a dairy farm so long before he came to Cornell that he still catches himself shaking hands one finger at a time.

\* \* \*

Extract from Co-ed's letter home: "I'm getting fat. I weigh 135 stripped. Of course the scales in the 710 lab may be wrong, but that's what they indicated."

Remember the good old days when silk stockings were within the reach of all?

\* \* \*

He: Your little brother saw me kiss you. How can I keep him from telling?

Finanee: He usually gets a dollar.

\* \* \*

Then there's the one about the absent-minded sculptor who put his model to bed and chiseled on his wife.

\* \* \*

A man had two dogs which he was putting through some paces for a vaudeville producer in trying out for his show. After the producer, thoroughly bored, had seen the act, the little dog turned to the producer and said: "Well, how about it? Do we get the job?"

"What!" exclaimed the producer, "Does that little dog really talk!"

The man wearily replied, "No, the big dog is a ventriloquist."

\* \* \*

Little brother: Paul, if God makes all the blondes and brunettes, who makes all the redheads?

P.T., absently: You know, I've often wondered.

\* \* \*

We were reminiscing over a few steins the other night about the amusing things that had happened to us in the schools we attended before coming to Cornell. One lad brought down the house when he told us about an incident that happened in grammar school—it went something like this.

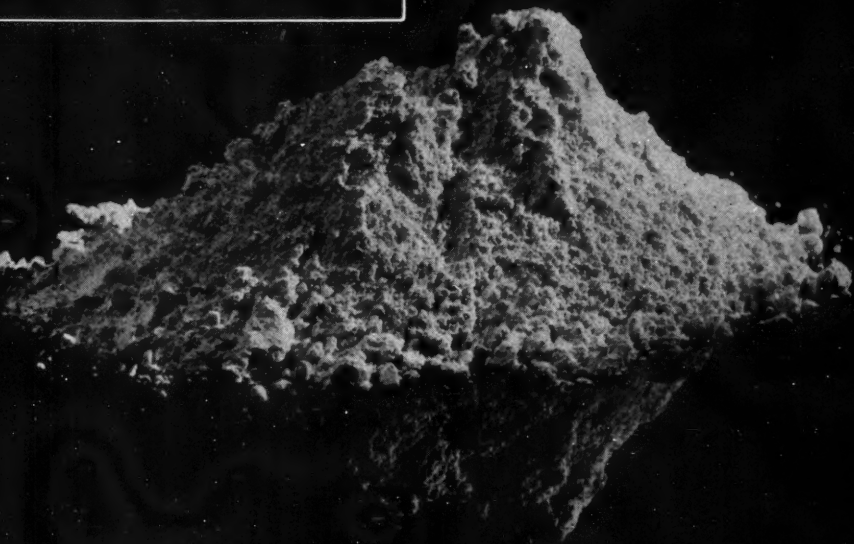
Johnny put up his hand and asked, "Teacher, may I leave the room?"

And the teacher answered, "No, Johnny, you stay here like a good boy and fill the inkwells."

\* \* \*

Well, see yez next month.

# POWDER OF LIFE



This is a handful of penicillin.

Yesterday it was amber drops of liquid excreted by *penicillium notatum* or common mold.

Today it is a powder ready to be shipped to some battlefield.

Tomorrow it may save a life.

In a great measure the triumph of penicillin is a triumph for air conditioning and refrigeration.

At Cheplin, Hayden, Lederle, Pfizer and Reichel—mass producers of penicillin—York-built air conditioning systems keep the nurturing tanks at just the right temperature for proper growth.

After the golden drops are extracted from the parent mold, York refrigeration takes over.

The liquid penicillin is frozen enabling evaporation to take place in a high vacuum at temperatures low enough to keep alive the bacteria-killing properties of the drug. The result is the stable powder that you see above.

Although penicillin has been put on a mass production basis, research still goes on. Scientific medicine will certainly discover new types of disease-killing molds and develop new and better methods of production.

Just as certainly the science of cooling will match their efforts with the necessary equipment to perform the tasks they require.

York Corporation, York, Penna.



## YORK REFRIGERATION AND AIR CONDITIONING

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885



# NEWS OF THE COLLEGE

## Tau Beta Pi

Tau Beta Pi has always prided itself on being more than merely an honorary engineering society. In addition to maintaining high scholastic requirements, its members have always been leaders in extra-curricular activities and in social functions on the Hill. This summer, "Tau Bete's" activities included the organization of the highly successful dance of September, as well as the staging of several parties of its own.

The new members initiated into the society during the summer months are:

Alumnus:

John Carlton Ward, M.E. '14

Students:

Roland P. Allen, V-12, CE '45

George H. Bailey, V-12, ME '45

Keith W. Benson, Jr. V-12, ME '45

John D. Cameron, V-12, ME '44

Kenneth Campbell Jr.,

V-12, ME '45

Julian Cole, ME, '44

David Day, V-12, CE '45

Henry J. Gieseler, V-12, ME '45

Jerrier A. Haddad, EE '45

Malcolm Hecht Jr., V-12, ChE '45

Edward T. Kornhauser,

V-12, EE '45

John McMaster, V-12, ChE '44

James B. Moore, V-12, ChE '45

William F. Pearson, V-12, ME '44

William B. Richardson,

V-12, ME '45

Robert O. Sinclair Jr.,

V-12, EE '45

George E. Williams, CE '44

At the last meeting of the term, John Fraser was elected president of the society and Edmund Cranch, vice-president. Other officers elected were Charles Hansen, corresponding secretary; Malcolm Hecht, recording secretary; and Kenneth Campbell, treasurer.

## Atmos

ATMOS, honorary society of the Sibley School of Mechanical Engineering, elected the following new members during the summer term:

Faculty:

Gerald A. Hill

George H. Lee

John R. Young

Undergraduates:

Keith W. Benson

Joseph Brozina

Harold Faught

Henry Gieseler

William Emrick

Frank King

Harry Moore

Arnold Page

John Rasch

Rodney Stieff

Walter Wells

Kenneth Campbell

Officers for the present term are W. B. Richardson, president; Frank King, vice-president; and John Rasch, secretary-treasurer.

Summer activities of the society included a discussion meeting with the faculty members at which the main topic was "Who grades the professors." A committee was appointed to compile a list of questions which might be used to determine student reaction to various courses. The group also considered the five-year plan, which was explained by Director Barnard.

On the sporting side during the summer there was a faculty-student softball game. The bitter battle ended in an 8-8 tie.

## AIEE

Two films on aviation, "Flight Log" and "Wheels Across Africa", instructed and entertained the Cornell student branch of the American Institute of Electrical Engineers at its first meeting of the Fall term. The meeting was held in Franklin Hall on November 17.

At the final meeting of the Summer term, the branch elected new officers. These are Robert Sinclair, chairman; Edward Atherton, vice-chairman; Conrad Disieno, secretary; and Richard Patrick, treasurer.

## Eta Kappa Nu

ETA Kappa Nu's first social event of the summer term was a smoker held in September at the Delta Chi house. After this, the chapter took a part in sponsoring the engineer's ball on September 30.

Considerable work was done during the term on the long-standing project of restoring a group of historic electrical models; most of these machines are now on display

(Continued on page 28)



## WHO'S WHO?

This photograph was found in the college office filed under "Engineering Faculty". Not a single mark of identification accompanied it. The CORNELL ENGINEER will award a genuine moustache cup, or a reasonable facsimile, to the first person who can name each man in the photo and tell us when it was taken.



# 25 Years that Created a New World of Radio 1919-1944

From 1919 to 1944 . . . RCA has pioneered in the science of radio and electronics . . . from world-wide wireless to national network and international short-wave broadcasting . . . from electron tubes to electron microscopes and radiothermics . . . from the hand-wound Victrola to the automatic radio-phonograph . . . from television to radar.

Twenty-five years of service to the nation and the public have made RCA a symbol of achieve-

ment and progress . . . RCA is a monogram of quality in radio-electronic instruments and dependability in communications throughout the world.

From the First World War to the Second, RCA developed and expanded its "know-how" in skilled engineering and production so vitally needed to meet the demands of war . . . these qualities will be reflected in the peacetime products of RCA.

## RADIO CORPORATION OF AMERICA

30 ROCKEFELLER PLAZA, NEW YORK CITY

*RCA LEADS THE WAY . . . In Radio . . . Television . . . Phonographs . . . Records . . . Tubes . . . Electronics . . .*



25 YEARS OF PROGRESS  
IN  
RADIO AND ELECTRONICS

# ALUMNI NEWS

## Edward Bausch

EDWARD Bausch, chairman of the board of the Bausch & Lomb Optical Company, philanthropist, and scientist, died in Rochester on July 30, 1944. He had been confined to his home for over two years.

He was born in Rochester in 1854, the son of John Jacob Bausch, one of the founders of the company. In his early years, he worked with his father and acquired an intimate knowledge of the manufacture of optical equipment.

At the age of 17, Edward Bausch entered Cornell University on a scholarship. He was quite prominent on campus and his activities covered a large and varied field. However, his chief love was athletics, and he served as president of the Athletic Association and made a name for himself as the arranger of the first football game between Cornell and Michigan. Were it not for his father's fear that athletics would interfere with his studies, he would have rowed in

the first intercollegiate regatta at Saratoga. This interest in rowing was manifested after leaving college when he organized the Columbia Boat Club, which owned the first four-oared shell on the upper Genesee River. Another interest he had in college was music. While at Cornell he published a waltz dedicated to his parents. Besides all this, he designed and constructed a microscope in 1872.

In 1874 Edward Bausch entered his father's business. His genius for designing and constructing microscopes was encouraged by his father, and he entered his work in the Philadelphia Centennial Exposition in 1876, where he first won acclaim for his craftsmanship. During the next two years Mr. Bausch took an active part in the founding of two well known scientific organizations. He was a charter member of the American Association for the Advancement of Science founded in 1877 and the American Microscopical Society founded in 1878.

Mr. Bausch's activity in the de-

velopment of all types of optical equipment is testified to by his many patents including trickoscopes, illuminators, microtomes, invertible microscopes, binocular microscopes and centrifugal testing machines. However, what is probably his most famous patent is the iris diaphragm shutter which caused the snapshot camera to become a popular plaything. This efficient shutter met the increasing demand for faster and better controlled exposures brought about by the improvement in photographic dry plates.

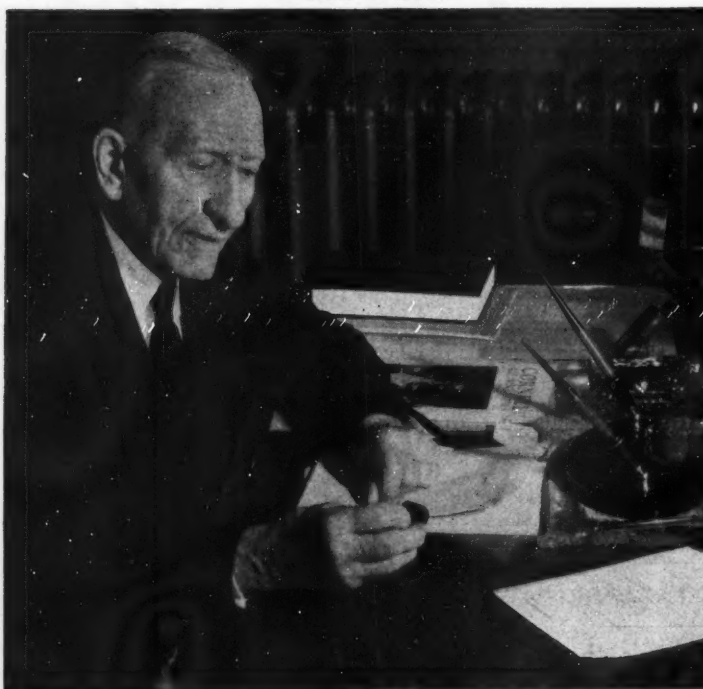
When, at the close of the century, the United States Navy sought a domestic source of supply for searchlight mirrors, they turned to Edward Bausch and his company. He introduced new and improved techniques on these mirrors, substituting parabolic curves for the old Mangin type and using a new heat-resistant silvering process. He continued to cooperate with the armed forces of this country and during the first World War, he successfully overcame the shortage of optical equipment caused by the loss of the German supply.

In recent years many honors and awards have been bestowed on Edward Bausch. In 1931, the University of Rochester conferred the honorary LL.B. degree upon him. In 1936, the American Society of Mechanical Engineers presented him with a gold medal, "for meritorious mechanical developments in the field of optics." A year later, the parent chapter of Sigma Xi national scientific fraternity at Cornell conferred an alumni membership on him, one of five granted in fifteen years.

In addition to his scientific work, Edward Bausch was well known as a philanthropist, and in 1940 he presented his Rochester home and grounds to the Rochester Museum of Arts & Sciences and built the first unit of the new museum himself.

He was also an active member of  
(Continued on page 32)

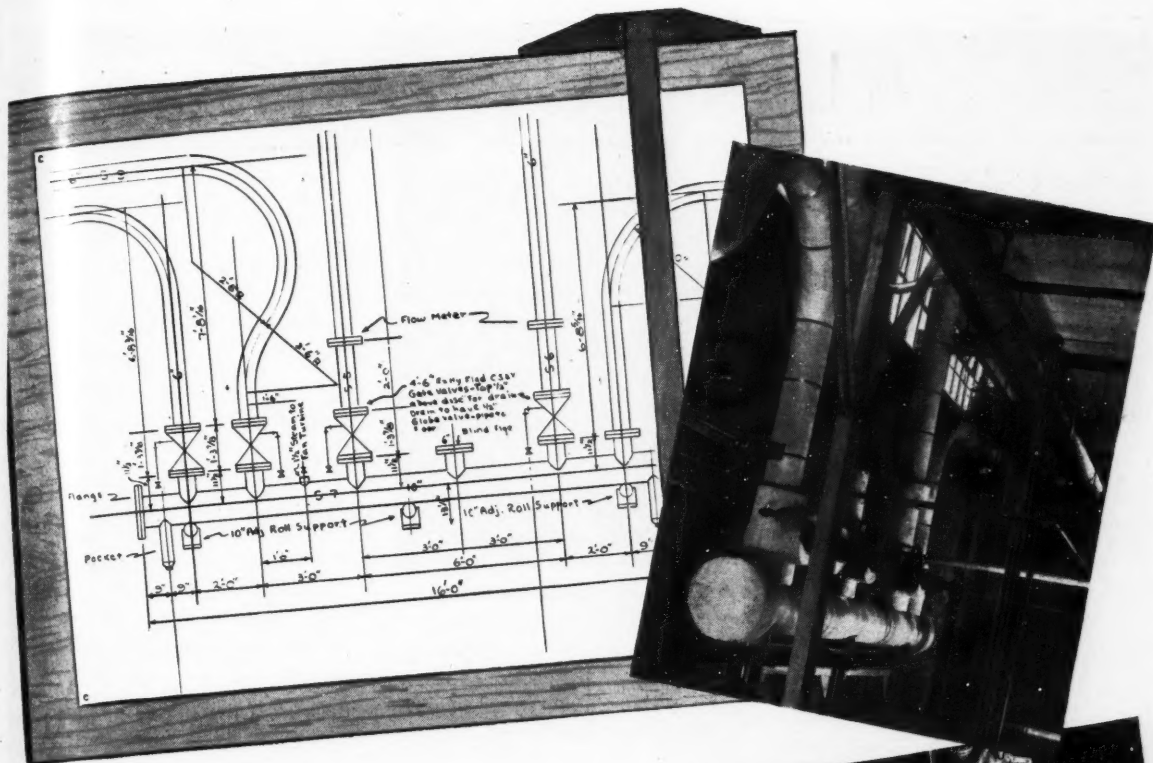
Edward Bausch, Chairman of the Board of Bausch & Lomb Optical Company, who died in July. —Courtesy Alumni News



Yo  
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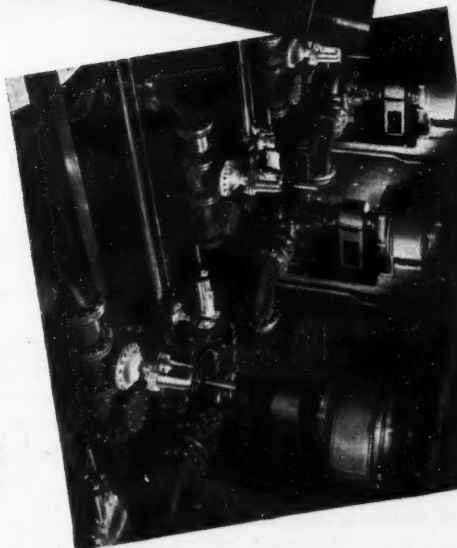
## You can't take piping for granted

WHEN you draw a piping line on a blue print—when you indicate a symbol that means a valve—remember that ultimately those lines and symbols will have to be translated into hard metal, and that those lines you draw will have much to do with determining the success or the failure of the engineering project.

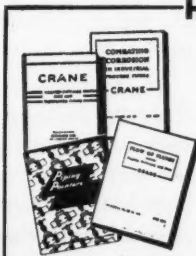
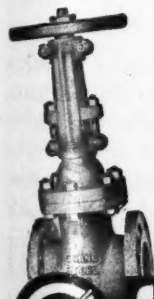
The parts that make up any piping system are many. But each

one of these parts—the pipe, valves and fittings; the traps, joints and gauges; the flanges, unions, gaskets and insulation—is part of the complete Crane line.

When you are writing specifications, keep this fact in mind: Crane's single source of supply, Crane's experience, and Crane's reputation for high quality will do much toward assuring the success of the systems you design.



### HERE'S ENGINEERING DATA TO HELP YOU



Crane engineers have prepared several important books and treatises on piping systems. These include the Crane Catalog, listing more than 48,000 piping items and containing valuable engineering data—Piping Pointers Manual,

packed with piping information—Flow of Fluids and Combating Corrosion, two technical papers of value to any one laying out pipe lines. This material is available from the following persons in your school, for reference.

Prof. F. O. Ellenwood, Heat Power  
 Prof. L. T. Wright, Heat Power  
 Prof. C. O. Mackey, Mechanics Lab.  
 Prof. C. D. Albert, Machine Design  
 Prof. Paul H. Black, Machine Design  
 Prof. W. N. Barnard, Director of School of Mechanical Engineering  
 Prof. M. Bogema, Hydraulics  
 Prof. F. H. Rhodes, Director of School of Chemical Engineering  
 Prof. J. R. Moynihan, Engineering Materials

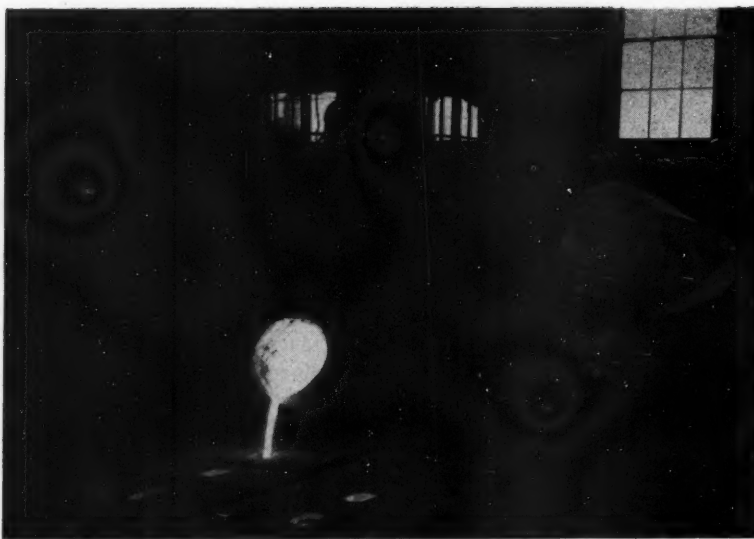
# CRANE

VALVES • FITTINGS • PIPE  
 PLUMBING • HEATING • PUMPS

BRANCHES AND WHOLESALE SERVING ALL INDUSTRIAL AREAS

Vol. 10, No. 2

25



Three students work together to pour molten cast iron in the foundry. All wear boots for protection against white hot metal.

### Materials Processing

(Continued from page 15)

the instructors and helpers. Both Prof. Geer and Mr. Mack can either give a lecture or demonstrate an operation on any machine. They both have had experience in the engineering field and exhibit tricks and stunts they have learned. Prof. Geer is famous for his inventions, inquiring mind, and his Johansson gauge blocks. Perhaps that is the reason he was selected as one of three to work on the new iron lung for the Cornell Infirmary.

### Precision Instruments

To supplement the machine shop course and further probe into the the subject of "Measuring Instruments," Prof. Geer runs a course of his own. He discusses *where, how, and, most important, why* a measurement is taken on a project or machine. This work includes use of various types of calipers, micrometers, depth gauges, angle gauges, dial indicators, and height gauges. Most of these instruments are delicately adjusted to insure accurate measurement. When the familiar ring of an instrument hitting the floor is heard, Mr. Geer ages five years and mumbles a short prayer (of course) under his breath.

### Forge Shop

The course 3S11, commonly termed as "Metal-Bending," under the direction of Mr. Hill and Mr.

Morgan, completes the Materials Processing Department. Largely through the efforts of these men, the forge shop has become a more enjoyable place to work. Safety and cleanliness are stressed throughout the term. A list of the work done in the course will perhaps give a general idea of its nature: Hand - Forging, Machine-Forging, Spot-Welding, Gas-Welding and Atomic Hydrogen Welding. Mr. Hill has become an expert solderer through his association with the V-12's. Almost thirty times a term two pieces of a broken bib-pin are held hopefully in his direction. He silently looses three more hairs and solders the pin together again.

This department has, perhaps, the most cheerful, chatty, and good-natured faculty on the hill. They frequently have parties at the rear of the foundry which help strengthen the department spirit. Each meeting is climaxed with a tournament of horse-shoe pitching. Usually Mr. Curtis emerges victor and champion.

### Future Plans

At the present time, Prof. Geer, acting head of the department, is making post-war plans which include replacement of all obsolete equipment. This should add materially to the effectiveness of these courses when they are moved to the proposed new engineering buildings.

## NEWS BRIEFS

### Electro-Tinning Process

RECENTLY a new high-speed electro-tinning process for copper wire, which requires only half as much scarce tin as do older methods, was demonstrated at the National Metals Congress in an E. I. du Pont de Nemours & Co. exhibit.

The plating apparatus is ingeniously arranged so that there is a minimum of tension and drag on the wire. In fact the wire zips in and out of as many as seven bathtubs of cleaning and plating solution without touching the rim of any of the tubs. It emerges from the baths with its smooth new coat of tin untouched by any metal or other solid material and therefore unscratched.

This "dainty dip" is achieved by keeping the baths literally overflowing. They are placed so that the wire passes through the heaped up part just missing the rim of the vessels in each case. The excess fluid is removed between the baths by compressed air blasts.

### Red-Ball Express

THE new U. S. Army "Red-Ball Express," probably the longest and fastest truck train in history, was inaugurated by Colonel Richmond and Brigadier General Ewart G. Plank, U. S. Army, Commanding General of the Advanced Section, Communications Zone, European Theater of Operations to clear up the supply difficulties of our forces in France.

The highway is a giant loop that feeds the one-way traffic of thousands of loaded motor vehicles to the front lines and sends empty ones back to Normandy for more cargo. Trucks travel down one side of the loop and return on the other side. Every truck is labeled "priority" by a red disk on its front and rear. The same red ball is painted on the helmets of the special force of military police which controls the road.



## Seasoning for a Batch of Alloy Steel

Q.W.L. Photo by Palmer, in an Allegheny Ludlum plant

## ... But Not to Hitler's Taste

WAR'S emphasis is on *strength*, in men and in steel. That truism is pictured for you above, in a scene showing the last admixture of alloys going into an electric furnace in one of the Allegheny Ludlum mills.

In the shortest possible time after the arc is struck, that batch of alloy steel will be war material in use. It may be stainless bomb racks or ammunition chutes; tool steels fashioning a tank; valves or nitrided shafts in engines; electrical steels in gun, engine or plane controls—or in radio range-finding and com-

munications equipment. Whatever it is, Hitler definitely won't like it. Nor will Tojo, and the reasons why are inherent in the steels themselves.

Special alloy steels are the "Supermen" of metals. Whatever job there is for steel to do, they do better. Many jobs they do today, in fact, weren't even possible until a special steel was developed for the purpose—the records of our Research Laboratories are full of such instances.

It has been said, and truly so far as combat equipment is concerned,

that this is an "Alloy War." Much has been learned that you will carry forward as the commercial technicians of the future.



W & D A-9316



## College News

(Continued from page 22)

in the Franklin Hall computing room.

The following new men were initiated into Eta Kappa Nu on October 14:

**Ted Bauer**  
**John Bernier**  
**John Casazza**  
**Conrad Desieno**  
**Jim Falk**  
**Orrington C. Foster**  
**Paul Moore**  
**Paul Russell**

A banquet was held afterwards at the Alhambra, with the famous Prof. C. L. Durham as speaker.

In the final meeting of the term, the following officers were elected: President, Ed Kornhauser; Vice-President, Jerry Haddad; Corresponding Secretary, G. S. Smith; Recording Secretary, Maury Welsh; and Treasurer O. C. Foster.

## Appointments

SINCE the last appearance of this column in May, several important appointments have been made in the Engineering College faculty. In September, Professor of Industrial Education L. A. Emerson was appointed assistant dean of the College. H. A. Loberg, associate professor of administrative engineering, was named an assistant to the dean in July.

W. M. Sawdon, professor emeritus since 1941, was recalled during the summer and appointed professor in the mechanical engineering laboratory. H. M. Giff was promoted to associate professor in the C. E. school, and R. T. Hinkle was made assistant professor of machine design. Leaves were granted to G. F. Carrier and E. K. Gatcombe, instructors in machine design.

## ASME

IF you should see an M.E. walking absent-mindedly about the campus muttering "My friends . . .", do not be alarmed. He is probably rehearsing a speech with which he hopes to win the ASME public speaking contest. The contest, started during the summer, pro-

vides for two speeches to be presented by students before each meeting of the ASME. Two faculty members have agreed to judge the speeches, and will award a Marks Handbook late in the term for the best one.

The new officers of the Cornell ASME branch, elected late last term, are Frank King, chairman; Ivan LeFave, vice-chairman; Harry Moore, secretary; and Richard Beard, treasurer.

ASME was active throughout the summer, supplementing its meetings with a group picnic.

## Pyramid

During the summer term, Pyramid Society, the Civil Engineering Scholastic-Social Society, initiated fifteen upperclassmen into its ranks. Officers installing these men (listed below) were Calvin G. Brown, president; Richard E. Stouffer, vice-president; and Harry J. McGuirk, secretary-treasurer:

**Roland Allen**  
**Ralph Atkinson**  
**Robert Barde**  
**Louis Beatty**  
**Jose Esclusa**  
**Richard Kuhn**  
**Jack Gilbert**  
**Harry Lindahl**  
**Robert McCarthy**  
**William Pansius**  
**Nathan Scherr**  
**Miquel Torregrosa**

The purpose of the society in the past has been to promote interest in civil engineering as a profession and to support the honor code of the school. It proposes to do this during the coming year and in the near future will release plans aiming for the attainment of these purposes.

## AIDjebbar

ON October 8, the members of AIDjebbar, honorary society in chemical engineering, interrupted a beer party at the Phi Delta Theta Fraternity House long enough to initiate the following new members:

**Walter Brandsma**  
**George De La Mater**  
**John Drew**  
**James Edison**

**Richard Ennis**  
**James Gillin**  
**Joseph Jewett**  
**Arthur Jones**  
**Arthur Lennox**  
**Hugh Ogburn**  
**Richard Rice**  
**William Ruch**  
**Robert Simmonds**  
**Scott Smith**  
**Thomas Underhill**

Al-Djebbar plans an active term, highlighted by several parties. Officers for the current term are Bryce MacDonald, president; George Baumann, vice-president; and Paul Atteridg, secretary.

## ASCE

Although inactive during most of the summer term, the ASCE held a meeting in October to make plans for the winter terms, and to elect officers. The new officers are David Day, president; Arthur W. Beale, vice-president; and Sam Haines, secretary-treasurer. Entertainment was provided by movies depicting various phases of building construction in New York State by the A. Friederich & Sons Co. of Rochester. Refreshments of ice cream and cookies were served after the pictures.

## Chi Epsilon

SEVEN new members were elected to Chi Epsilon, honorary C.E. fraternity, during this term. The new members are:

**David Day**  
**Roland Allen**  
**Calvin Brown**  
**Seth Heartfield, Jr.**  
**Lyle Rowley**  
**Nathan Scherr**  
**Arthur Whinston**

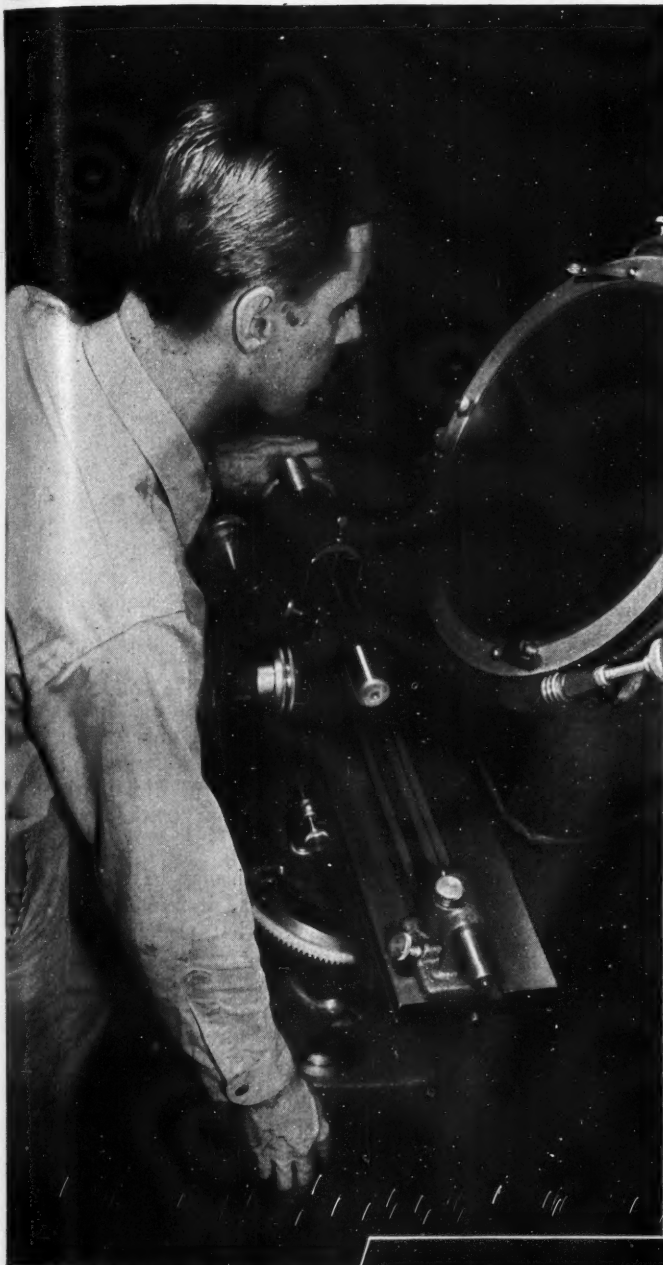
Chi Epsilon is planning an ambitious program of activities this winter.

The following officers were later elected for the coming year.

President, David Day  
Vice-president, Lyle Rowley  
Secretary-Treasurer, Seth Heartfield, Jr.  
Associate Editor of the "Transit", Arthur Whinston

THE CORNELL ENGINEER

## Test after Test Leads to Year after Year of Dependability



Every part of every Busch-Sulzer Diesel engine is rigidly inspected and tested for strict adherence to specifications before assembly. Then the assembled engine undergoes an operating test for performance standards. Finally, before shipment, the dismantled engine's working parts are given another painstaking inspection.

This testing is but one of the factors that contribute to Busch-Sulzer Diesel engines' reputation for dependability and long life. Other factors are the skill that should be expected of America's first builder of Diesels—plus simplicity of design that results in fewer moving parts, better lubrication and less wear.

Our facilities and trained personnel have been greatly expanded in wartime. When conditions permit, we will go right to work on postwar orders without reconversion delays. Why not acquaint us now with your requirements? We build both marine and stationary engines, both 2-cycle and 4-cycle, with a variety of speeds. An inquiry on your letterhead will receive prompt attention.

**BUSCH-SULZER BROS.—  
DIESEL ENGINE COMPANY  
SAINT LOUIS**

One of many tests of Busch-Sulzer parts. Magnified 62½ times, the image of screw threads is compared with a standard form to prevent errors not visible to the naked eye.

**BUSCH-  
SULZER**  
ST. LOUIS



*America's Oldest  
Builder of*  
**DIESEL ENGINES**

## Army Engineers

(Continued from page 11)

stayed behind. I have seen and known in my own experience, Army artisans, mechanics, foremen and superintendents who have done jobs such as no civil organization with which I am familiar could have done.

They have been part of and have seen every day the miracle of the impossible being accomplished. They have witnessed the miracle of our supplies and munitions and requirements being always in the right place at the right time. My group was halfway around the world, but the supplies and the logistics back of our forces illustrated the magnificent job and accomplishments done every day by our forces during this war. So those boys have gotten used to the impossible. They have become accustomed and inured to the miraculous and they are ready to step in and do the impossible for post-war economy when they get back.

### Fair Start

Therefore, these boys shouldn't be expected to step back into the jobs that they left, or to start at the bottom rung of industry, engineering or construction if they are among the millions who have never had jobs, but have come out of school. I say this, not so much because it would be unfair to those boys (I think that is secondary), but because it will be unfair and stupidly blind of American industry to waste the potential wealth which our forces are going to present to us for their employment, further development and further training.

In addition to the training which these men have had in specialists' schools and in actual operation in the field of combat, we will have those thousands who will have had special college training, in the various courses that have been open to them throughout the country.

When I returned from several trips to Russia between 1929 and 1935 and talked on several occasions to such groups as this, many of my friends thought that I was at least turning slightly pink because I was enthusiastic about some

of the things that Russia was doing and most enthusiastic about what they were doing in the field of education and because I predicted in 1930 that if the test ever did come to Russia she would be unbeatable, primarily because she had recognized the fact (that we until now have not recognized) that a nation's number one natural resource is developed brainpower and she was developing her brainpower starting from scratch out of a compulsory educational system for all up to 16, which selected those best qualified for and most interested in further development. Russia has consistently been developing her finest brains, frequently and usually from the most unlikely sources.

### Developed Brainpower

We are discovering now as a result of this war, I hope, that developed brainpower is our number one resource and we are seeing that same phenomenon that Russia saw, of fine brains, fine minds, coming from the most unlikely, unpromising backgrounds. I have seen in my own regiment, the emergence of our most able leaders out of our training programs, specialist schools and O.C.S., where an analysis of their background or educational equipment would not show anything like the capacity and capabilities developed. I hope and I pray that we will take advantage of this opportunity to continue the vocational training, the trade training and the education of these men and women as they return, on a selected basis. If we don't, if we let this opportunity drift into a political football, it is the fault of such groups as ours here tonight and not, as we are so prone to say, Government, because if any group should know, we should, that Government is us. Government will do what we demand and go where we lead, and if we don't take the leadership in the further development, education and training of these men, it is our own fault and we will have lost the greatest opportunity that any country has ever had and will no longer deserve to be called professional men.

Now just what is American business and American industry going to do in preparation for the return

of our several million fighting men and women? Does American business and industry expect that a World War I philosophy and a Versailles Treaty intellect will be adequate and effective in providing a leadership acceptable to these new veterans? This is our most pressing question because if the answer is "Yes", be prepared for a coalescence of these millions of men and women into the most powerful pressure group this country has ever known, one which will justifiably demand the integration of the veteran into the machinery and leadership of our entire post-war economy. Apple-selling veterans after this war will mean a national tragedy which will shake the very foundations of our competitive industrial system. But if American business will now recognize the return of our veterans as an unprecedented opportunity for a partnership to provide the moral, spiritual and scientific leadership in world organization and cooperation and in the development of new industries, and we are fully awake to the part that partnership must play if civilization and American leadership are to survive and flourish, then and only then will we be keeping our appointment with destiny and our obligations to those who will not return.

The time may be all too short. The job and its responsibilities are clear in that each of us should throw his continuing effort and influence toward a recognition of our unprecedented and never-again-to-be-equalled opportunities and obligations to fully utilize and to complete the training and education of this war-created source of national power and wealth. In other words, the re-employment of the returning veteran is a God-given opportunity as well as a national obligation.

### We Beg Your Pardon . . .

Professor Gilmore D. Clarke has been Dean of the College of Architecture since 1938, not 1943, as implied in our last issue.

Mr. F. L. Ackerman writes us that Mr. Klauder, and not Mr. Ackerman, is the designer of the War Memorial.

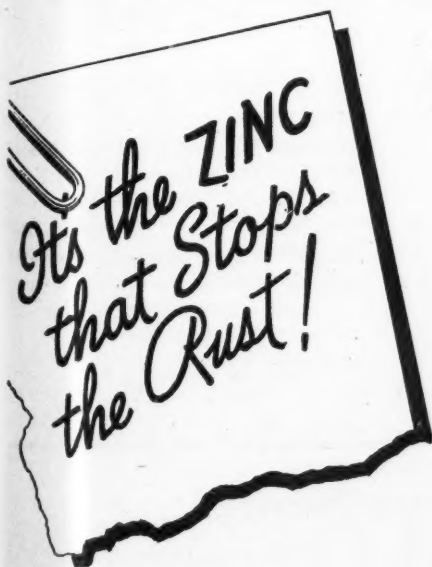


# ZINC provides double protection

- 1 by simple coverage
- 2 by electro-chemical action



Yes, zinc does double duty when applied to metals. It gives mechanical protection, with a sheath of rust-resistant metal; the durability depends on the thickness of the zinc. Zinc is also a rust inhibitor—it literally "stops rust before it starts", through electro-chemical action. The U. S. Bureau of Standards says Zinc is "by far the best" protective metallic coating for rust-proofing iron or steel.



## Lifetime Galvanized Roofing

With reasonable care, galvanized (zinc-coated) roofing will last a lifetime. Its care is a simple matter—a few precautions taken at the right time is all that is necessary. These are fully described in a booklet, "How to Make Galvanized Roofing Last Longer", which will be sent free to anyone upon request. A post-card will do—send it today.

**AMERICAN ZINC INSTITUTE**  
INCORPORATED

60 East 42nd Street • New York 17, N. Y.

Ad No. 1—A.Z.I.

## Alumni News

(Continued from page 24)

the Cornell Club of Rochester, New York.

It was always Dr. Bausch's firm belief that optical equipment could be manufactured at low prices, yet maintain their high quality by production on a volume basis. The huge production of his company is a tribute to the success and practicability of his theories. His death on July 30th brought one of the most distinguished careers in the history of American Science to a close.

### J. P. Dods, M.E. '08

JOHN P. Dods, M.E. '08, has been appointed director of advertising and sales promotion for the Columbia Steel & Shafting Co., the Edgar T. Ward's Sons Co., and Summerill Tubing Co., with offices in the Norristown Penn Trust Building, Norristown, Pa. He was formerly connected with the affiliated companies in research and promotional capacities.

### J. W. Parker, M.E. '08

JAMES W. Parker, M.E. '08, has been elected president of the Detroit Edison Co. by the directors. He was formerly vice-president and general manager.

Parker started work with the company as a boiler room engineer in 1910, was made chief engineer in 1924, vice-president and a director in 1935, and general manager in 1943. In 1942 he was president of The American Society of Mechanical Engineers and was awarded the degree of Doctor of Engineering by the Stevens Institute of Technology.

### Dr. Sanford A. Moss

DR. Sanford A. Moss, Ph.D. '03, General Electric consulting engineer famed for his pioneer work on

airplane superchargers, has been given the New England Award for 1944 by the Engineering Societies of New England, Inc., for his outstanding work on the supercharger. Presentation of the award was made by H. C. Hamilton, president of the organization.

The New England Award, established in 1941, is given annually "to a living engineer, resident in New England, who by outstanding achievement shall merit recognition of his accomplished work as well as of his character by his fellow engineers of the New England States." Dr. Moss is a life member of the American Society of Mechanical Engineers, and has participated extensively in the work of other engineering societies and the American Standard Association.

### S. A. Clow, M.E. '38

CAPTAIN Sherwood A. Clow, M.E. '38, is now assigned as Signal Property Officer, 1850th Service Unit, Camp Chaffee, Ark. While at Cornell University, Captain Clow was a member of the Phi Sigma Kappa and Pi Tau Pi Sigma fraternities, and the American Society Heating and Ventilating Engineers, and the American Society Mechanical Engineers.

### W. H. Boehm, M.M.E. '93

WILLIAM H. Boehm, M.M.E. '93, and his wife celebrated their Golden Wedding Anniversary on September 20, 1944. Mr. Boehm was Vice President and Manager of the Boiler and Machinery Insurance Fidelity and Casualty Company before his retirement.

### B. R. Edstrom, C.E. '25

BJORN R. Edstrom, C.E. '25, has formed the Edstrom Trading Co. AB, to represent American industries in Sweden after the war. Headquarters are at 6 Arsenalsgaten, Stockholm, Sweden. Edstrom has secured agencies for Wierton Steel

Co., Bendix Home Appliances, Inc., and Borg-Warner Corp., and expects several more contracts shortly. In this country for a few months, working out of the company's New York City office, Room 809, 250 Park Avenue, he writes, "Everywhere on my travels in this country I have met Cornell men in responsible positions, and have also found, to my satisfaction, that Cornell enjoys a splendid reputation as a University, and especially as an engineering school. I wish Cornell all success in the Engineering School's new building program."

### D. D. Crandell

DEAN DeForest Crandell of Buffalo, B. Chem. '22, has been elected a vice-president of the National Gypsum Company. He had been director of research since 1928, and through his efforts, exterior gypsum building boards and roof planks that have replaced lumber for needed government and other emergency construction, were developed.

As an undergraduate at Cornell he was a member of Sigma Pi, and The Officers Club. He was a lieutenant in the ROTC, and the holder of State Cash and War Service Scholarships.

### R. T. Van Ness, M.E. '23

RUSSELL T. Van Ness, M.E. '23, of 108 Brandywine Boulevard, Wilmington, Delaware, is manager of the industrial engineering division of E. I. duPont de Nemours & Co.

### L. C. Welch, M.E. '06

L. C. Welch, M.E. '06, Assistant General Manager of Sales in Charge of the Lubricating and Sales Technical Service Departments of Standard Oil Company of Indiana, was elected to membership on the Board of Directors at the annual meeting of stockholders at Whiting, May 25, 1944.

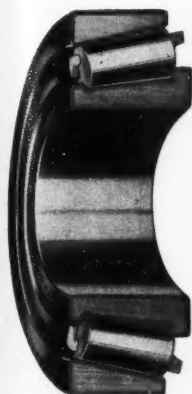
While at Cornell Mr. Welch  
(Continued on page 38)

## Cornell University Placement Service

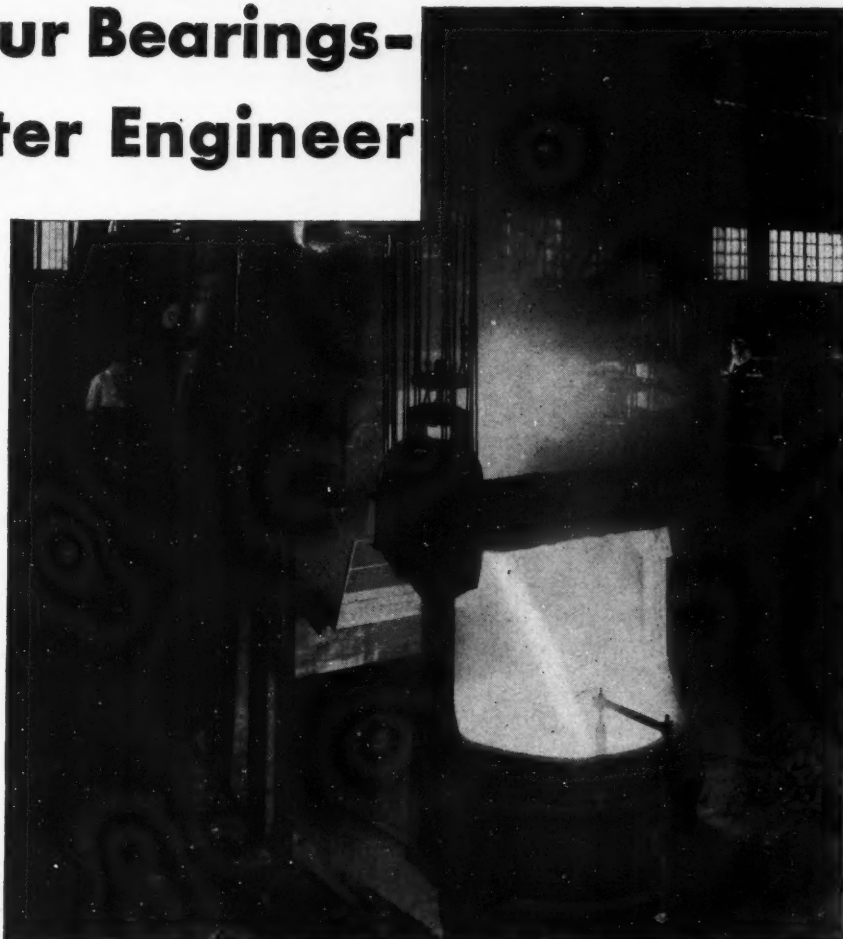
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Order Now — Secure them when you need them.

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**TRIANGLE  
BOOK  
SHOP**

### **U.S.S. Dolphin**

(Continued from page 8)

structural weakness there was appears to have been manifest in the physical make-up of these civilian experts rather than in the structure of the Dolphin.

The remainder of the story is soon told. The ship tied up at the dock at the Norfolk Navy Yard, and then followed a long history of the unwinding of red tape, some minor overhauling and refitting in the ship itself, painting and polishing and finally, in the fall of 1886, the ship was taken out under the eye of the U. S. Naval Board of Inspection, put through her paces including among other things a practice "abandon ship." And so with all of these tests passed to the satisfaction of the Board, the ship was accepted, incorporated into the fleet and served thereafter a long and reasonably useful life as a unit of Uncle Sam's Navy.

If there is any lesson to be drawn from this story, it is that, in case of "doubt," actual test under operative conditions is better than apprehension based on surmise.

### **Alex Drogin**

(Continued from page 16)

and though he made the squad every season since then and has played in many a game it wasn't till the Colgate game this year that he was in the starting lineup. He made that a memorable occasion by running back the opening kickoff from his left halfback spot 87 yards to the Colgate six yard stripe. Then Al took the ball over for the score and promptly added the extra point. Playing of this nature in other games has made Al one of the leading scorers in the East. Now a wearer of the 'C', Al has, even after his entrance into the Corps, taken an active part in his other organizations.

Probably the nicest thing about Al, with his playing and good looks, is his modesty which makes him one of the best liked fellows on the field, campus and in the classroom. He is shy, quiet, and reserved though his laconic remarks and witticisms are well worth waiting for.

At the end of this term Alex will receive his degree in Civil Engineering after which will follow training

at Parris Island. This will lead to a commission in the Marine Corps.

### **Bryce MacDonald**

(Continued from page 17)

nell and Chemical Engineering, Mac looked a little puzzled. "Well," he said, "my father is a chemist, so I come by the chemistry part honestly—but as to Cornell, I don't know for sure just what it was. I came up here one "Cornell Day" and liked it a lot. Of course, it's one of the best schools in the country, and I had a chance for a McMullen Scholarship, which was a big factor. But," he added, smiling, "like all Chem E's, I've often caught myself wondering just why in hell I ever came here anyhow."

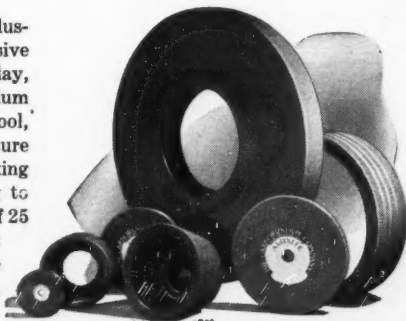
After he graduates with a B. Ch. E. degree next June, Mac plans to live somewhere in the Mid-West and really relax for the first time in four years. "You see," he explains, "I'm engaged to Ann Huttar, who graduated from Cornell last October, and I figure that if she keeps on working like she is now, she can just about support me in the style to which I am accustomed."

## The plane that had its face lifted!



The B-25 Mitchell bomber has always been a tough baby. And when they lifted its face and gave it a 75 mm. gun for a nose, they made it even tougher! There was only one drawback: *Quantity production* of that special cannon. It might have been serious—if a foundry hadn't found out how to *cast* the cannon breech rings instead of machining them. And here Carborundum played an important part by supplying the right grinding wheels to improve and speed up production of these rings.

It was more than fifty years ago that industry bought its first manufactured abrasive grinding wheel from Carborundum. Today, industry uses abrasives by Carborundum everywhere from foundries, machine tool, aviation and automobile plants to furniture and shoe factories. That is why a working knowledge of abrasives is a good thing to have. Write us today for a complete set of 25 free bulletins on the First Principles of Grinding. The Carborundum Company, Niagara Falls, New York.



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Under heavy loads—Ball bearings have proved their superiority in resisting heavy strains in such uses as bulldozers.

### Mighty Mites

(Continued from page 13)

are finished their diameters are measured from groove to groove to one ten-thousandths of an inch by special machines which employ the same size ball that will be used in the finished bearing. This type of

measurement insures that the part of the ring actually measured is its operating dimension. If the rings do not have exactly the correct diameter, however, they are not rejected; instead, by selective assembly, offsize inner and outer rings may be matched up to give the cor-

rect clearance in the finished bearing. Very accurate bearings can be made in this manner; and rings that are offsize in their race diameters yield as smooth running bearings as rings that are the correct size. The finished bearing is washed in a gasoline mixture and blown dry with an air jet. Although bearings must be lubricated, this is not done, as commonly supposed, to reduce friction. Actually, a dry bearing is more friction free than a lubricated one. They must be lubricated, however, to maintain the mirrorlike finish on the balls and races. If moisture gets into an unprotected bearing, its life may be shortened into a matter of hours instead of years. Since we have been at war, saboteurs have used this knowledge to hinder our war effort. In one plant, the bearings that passed by a certain man were found to be unlubricated. This man was apprehended and placed behind bars. If this plan had succeeded, bearings would have given out before their expected span had elapsed, and many of our war machines would have been crippled.

(Continued on page 42)

## ALPINE RESTAURANT

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Snow-covered views of campus scenes.  
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**BANNERS MASCOTS PILLOWS  
JEWELRY SOUVENIRS**

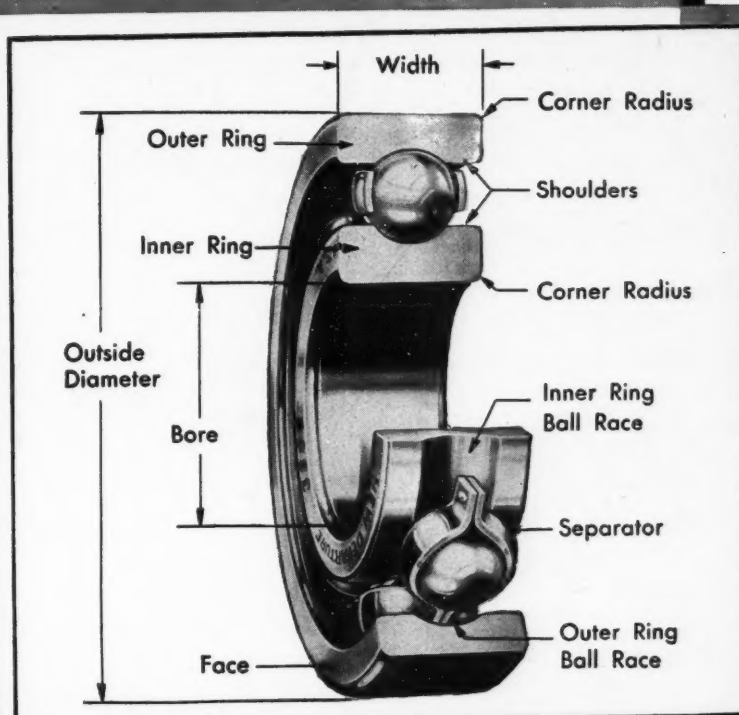
**THE CORNELL CO-OP**

Barnes Hall

On The Campus



# Ever wonder about the anatomy of a Ball Bearing?



The subject of the Ball Bearing is on everyone's lips nowadays, because of its immense importance to the prosecution of the war.

But how many know what a ball bearing is—what it does—why it is so indispensable?

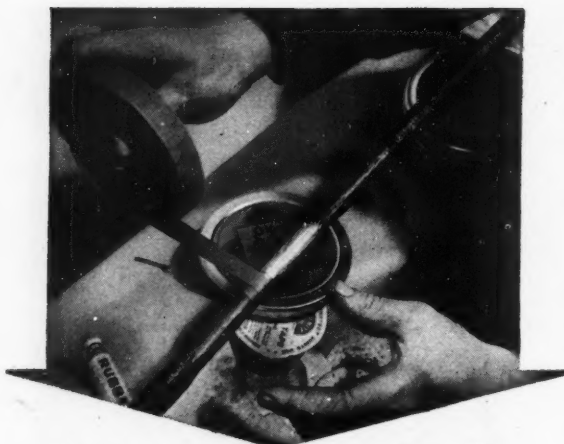
A ball bearing is not merely a steel ball! It consists of the assembled mechanism illustrated.

It is used wherever shafts turn, to support loads, to permit higher, smoother speeds. Because nothing rolls like a ball, it reduces friction and wear and assures that the precise "location" of machine parts is maintained.

To those who would know more about this "tremendous trifle" we offer free an interesting 112 page book entitled, "Why Anti-Friction Bearings?"

*nothing rolls like a ball*  
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## How to Make a Splice in Rubber Insulated Cable

● Illustrated Bulletin OK-1007 describes various splices and tapes for rubber insulated cables up to 5000 volts. To obtain a copy just write The Okonite Company, Passaic, New Jersey.



## STOVER PRINTING COMPANY

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Right and On Time Since 1909

### Alumni News

(Continued from page 32)

caught for the Cornell baseball team for four years and was captain for two years. He is chairman of the American Petroleum Institute lubrication committee and a member of the American Society of Mechanical Engineers, the Society of Automotive Engineers, and Beta Theta Pi fraternity.

### H. A. Kurstedt, C.E. '38

COLONEL Harold A. Kurstedt, USA, C.E. '30, 3912 Cutshal Avenue, Richmond, Va., was recently awarded the Legion of Merit for outstanding services rendered August, 1943, to January, 1944, as chief of staff of the Army Air Force Engineer Command in Italy. During that period he was responsible for the organization and successful establishment of the Command, bringing scattered aviation engineer units under unified control. He has been overseas for two years and has participated in four campaigns.

### P. T. Egbert, M.E. '15

PERRY T. Egbert, M.E. '15, of 408 South Albany Street, Ithaca, was appointed vice-president in charge of Diesel locomotive sales, July 13, by the executive committee of the American Locomotive Co.'s board of directors. Joining the firm in 1920 as a member of its engineering department, he was technical representative in the Far East in 1921 and recently played an important role in equipping the Army's Iran railroad with a special type of Diesel locomotive designed to meet the rigorous requirements of that route.

### J. S. Stone, C.E. '89

JAMES S. Stone, C.E. '89, stopped in at Lincoln Hall to renew acquaintances recently. He is a brother of Walter King-Stone of the College of Architecture. After 41 years of service with the U. S. Steel Corporation he was retired with pension in 1931. He has 8 grandsons in the service, one of whom is a prisoner of war in Germany.

### A. J. Blackwood, M.E. '24

ALBERT J. Blackwood, M.E. '24, director of fuel research of Standard Oil Development Co., is vice-president of the Society of Automotive Engineers handling Diesel engineering activities. On May 26, he attended the dedication ceremonies of the Diesel engineering laboratory at Raleigh, as representative of the at the University of North Carolina Society and as guest of Governor J. Melville Broughton.

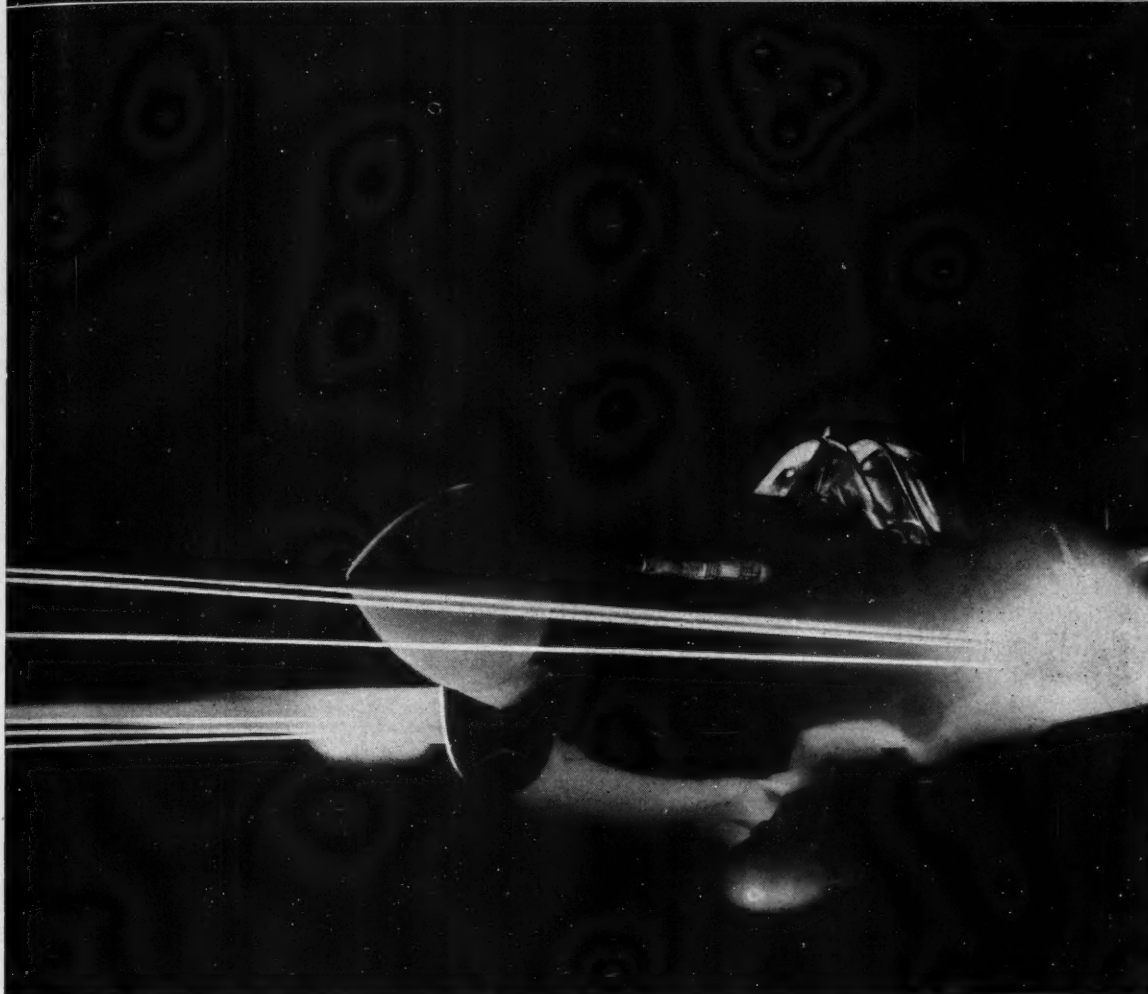
### E. W. Starr, '25

ASSISTANT Professor Ernest W. Starr has been promoted to associate professor in The Cooper Union School of Engineering, New York City.

Professor Starr has been a member of the Cooper Union faculty since 1931 and an assistant professor since 1935. A graduate of Cornell University in the Class of 1925, he taught at Worcester Polytechnic Institute from 1927 to 1930, and in 1930-31 was in charge of Class A of the advanced engineering course

(Continued on page 40)

## The glass that breaks over Germany...




**Y**OU'VE seen pictures of long range fighter planes with their "belly tanks" that carry extra gasoline. But have you ever wondered how the pilot gets rid of those tanks when they're empty, to decrease weight and gain extra speed and maneuverability?

The big problem in dropping the tank is to sever a tight pipeline connection from tank to plane quickly and positively. This isn't easy with metal, but Corning now makes a fitting from glass tubing that does the trick. The minute the pilot releases the mechanical grips that carry the weight of the tank the glass tubing breaks cleanly and the tank falls free!

War and Corning Research have put glass

in a lot of strange places. For instance, there was a time when almost all piping in chemical plants was alloy of one kind or another. Now chemical people have discovered that glass piping is better for many purposes, and Corning has even developed a method for welding it into continuous lengths.

Many of the new uses to which Corning has put glass will persist after the war. For many users have discovered for the first time how really versatile glass is as a material. They are finding out that it has unexpected strengths. That it resists abrasive wear and corrosion. That it is so fatigue proof Corning has even made springs of coiled glass 

for certain conditions. Perhaps after the war, in whatever business you choose to follow, you will also find that an intelligent application of glass can improve your product or production — Corning Glass Works, Corning, New York.

**CORNING**  
— means —  
**Research in Glass**



## Alumni News

(Continued from page 38)

of the General Electric Company's general engineering department.

He is a member of the American Institute of Electrical Engineers, an associate member of the Institute of Radio Engineers and a member of Tau Beta Pi, honorary engineering society, and Eta Kappa Nu, honorary electrical engineering society.

### M. N. Ripley, C.E. '26

MILLS N. Ripley, C.E. '26, Cornell University graduate and former eastern district sales manager for the Bijur Lubricating Corporation, has been appointed sales manager of the new regional and branch office sales headquarters of the Hydraulic Press Manufacturing Company in New York City. He was formerly employed by the Fairchild Engine and Airplane Company in New York. As an undergraduate he was a member of Sigma Phi Epsilon fraternity, Quill and Dagger, and Rod and Bob societies.

He was also a member of Masque, and became manager of the organization in his senior year.

### W. F. Bernart, Jr., M.E. '24

WILLIAM Francis Bernart Jr., M.E. '24, of New Canaan, Conn., has been elected executive vice-president of the Pitney-Bowes Postage Meter Company. Bernart was a member of Psi Upsilon fraternity, Sphinx Head, Tau Beta Pi, Phi Kappa Phi, and Atmos, honorary society in mechanical engineering. In his senior year he was chairman of the college honor committee and president of the Sibley Athletic Association.

### Philadelphia C.S.E.

THE Philadelphia, Pa. group of the Cornell Society of Engineers has reelected its officers for the current year. Gordon J. Mertz, M.E. '20, continues as chairman; Robert A. Hentz, M.E. '11, as vice-chairman; and Edwin H. Brown, M.E.E. '22, as secretary-treasurer.

### N. N. Tilley, M.E. '15

NORMAN N. Tilley, M.E. '15, is chief engineer of special engine projects, Studebaker Corp., South Bend, Indiana. He presented a paper on problems involved in spark ignition fuel injection engines for ground vehicles, June 6 at the national war material meeting of The Society of Automotive Engineers.

### J. B. Hawley, Jr., C.E. '21

JOHN B. Hawley, Jr., C.E. '21, president of Northern Ordnance, Inc., of Minneapolis, Minn., has become the biggest driller of wildcat oil wells in the country, according to Time Magazine of June 12th, 1944. An amateur in the oil business, he lost an estimated \$1,000,000 on dry wells before he "made his big strike" in May near Roundup, Montana. In June he was drilling for oil, or preparing to, in eighteen states. A colorful "profane" rambunctious Texas-born individual . . . no one

(Continued on page 42)



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REFRACTORY CRUCIBLES  
HIGH-TEMPERATURE CEMENTS  
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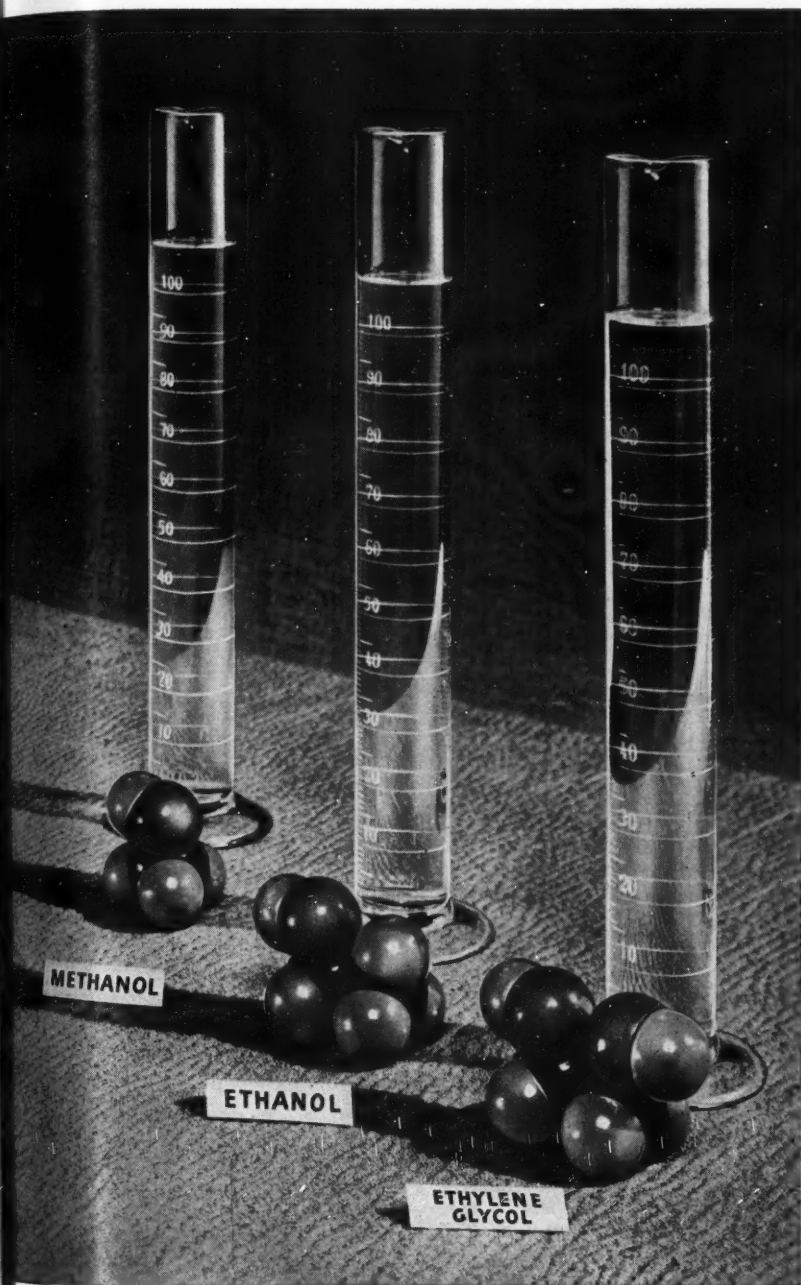
From the Following Materials:—  
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# Chemicals that protect your car!



HERE ARE THREE CHEMICALS that you are probably better acquainted with from the way they act as anti-freeze in your car than from the way they look in print.

These chemicals are manufactured in large quantities by CARBIDE AND CARBON CHEMICALS CORPORATION. Uncolored, they are water-white. To the chemists, who must know what they will do in your car, they are compounds of carbon, hydrogen and oxygen, the atoms of which are shown here in the molecular models.

ETHYLENE GLYCOL, ETHANOL and METHANOL are the bases of anti-freezes—and they help to take one of the worries out of winter for millions of motorists.

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**"Prestone"** ethylene glycol-base anti-freeze. One "shot" gives all-winter protection.

**"Trek"** methanol-base anti-freeze, which is again available to the extent that the production of methanol has caught up with its war-critical uses.

**"Blue-Flu"** ethanol-base anti-freeze. Not being manufactured this year because ethanol (ethyl alcohol) has a bigger war job to do.


Certain other anti-freezes formulated and manufactured by Units of UCC for large national distributors.

**"Rustone"** corrosion preventive which, when added to the water in a clean cooling system, inhibits the formation of rust.

Car owners are invited to send for the booklet P-11, "Manual of Cooling System Service." It will be sent without cost or obligation.

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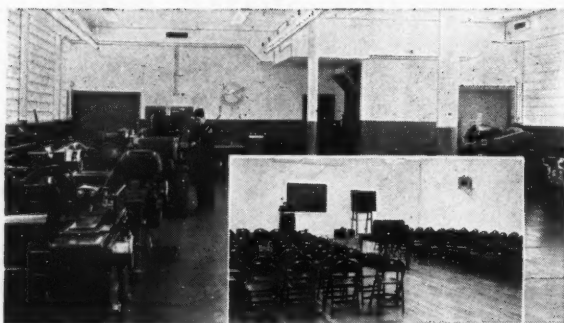
Carbide and Carbon Chemicals Corporation  
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National Carbon Company, Inc.

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## Achieving Post-war Super-accuracy Now with Frick Refrigeration

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## Cayuga Construction Corp.

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Daniel M. Lazar, '29  
President

L. Sanford Reis, '29  
Treasurer

This company is experienced in railroad, airport, utility, highway and industrial construction.

INQUIRIES ARE INVITED

## Alumni News

(Continued from page 40)

has yet been able to top Hawley's three-word description of himself; 'I'm a pirate,' says Time.

### J. M. Van Law, M.E. '27

JESSE M. Van Law, M.E. '27, is special assistant to the manager of the Atlantic Division of Pan American Airways, supervising scheduling of all aircraft. His headquarters are at La Guardia Field. He joined the company in 1929 in Lima, Peru, where he handled the first airmail between the United States and Peru. He is the son of Carlos W. Van Law, '97, and lives at 3 Glen Road, Larchmont.

### Mighty Mites

(Continued from page 36)

Bearings are so perfectly designed and constructed that they only very slowly wear out in the usual sense of the word. The balls, however are repeatedly subjected to great stresses, so that they may fail by what is called fatigue of the

The CORNELL ENGINEER wishes to announce the results of its last election and to extend congratulations to the new officers and members.

#### Business Manager

Seth W. Heartfield, Jr. CE '45

#### Associate Editor

Richard E. Goll, ME V-12

#### News Editor

Roderick Pearson, ChemE '47

#### Illustrations Editor

Philip E. Silberberg, CE '48

#### Circulation Manager

Richard Bass, Arts '45

#### Ass't. Circulation Manager

Harold Glasser, EE '47

#### Editorial Staff

L. R. Anderson, V-12

A. S. Rugare, ME '46

#### Business Staff

R. Erskine, ME '47

C. Fischer, Arts '47

R. Mann, CE '47

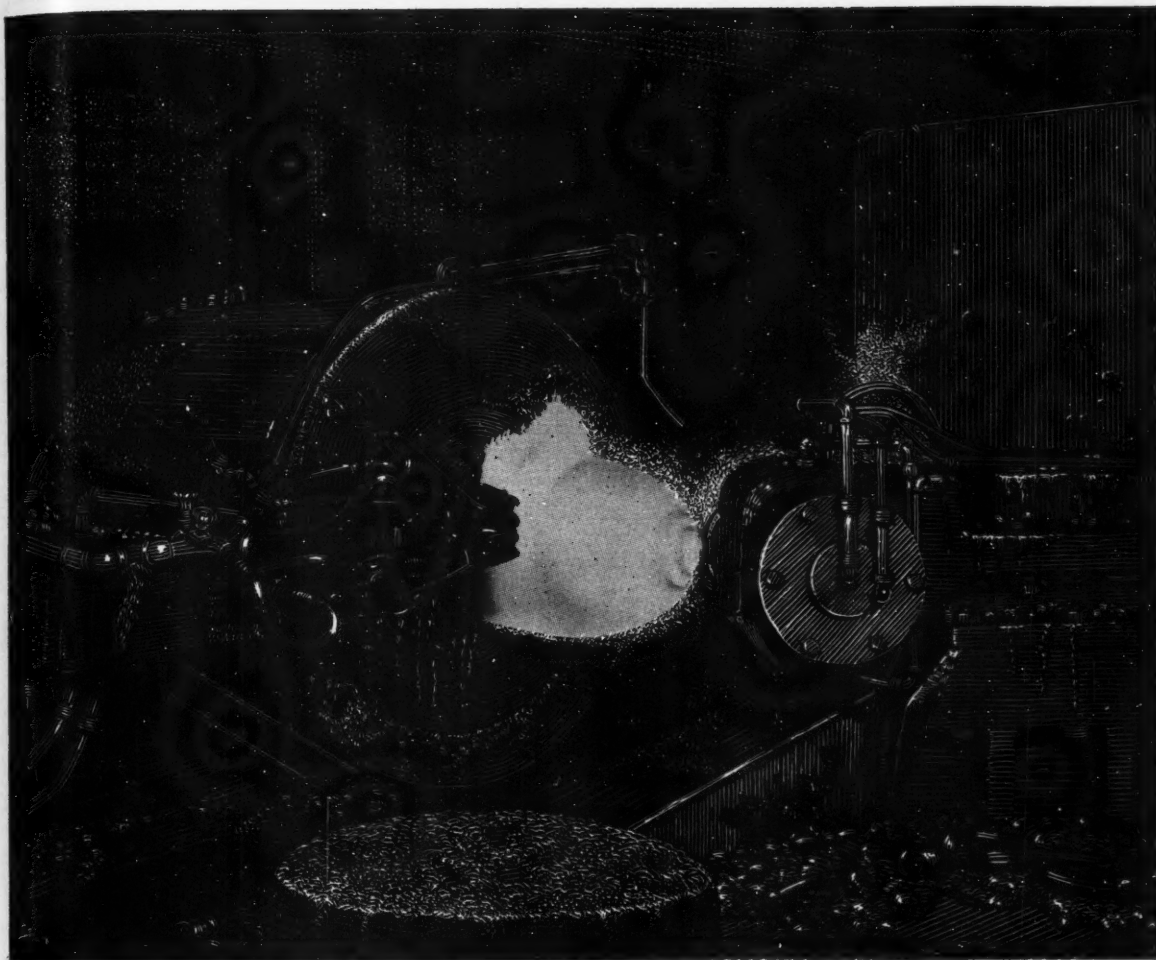
R. Owaroff, ME '47

metal. A fatigued bearing is not efficient as a friction reducer and must be discarded. A bearing that is well constructed from better material will be more efficient, subject to fewer stresses, and consequently may be run longer before fatigue sets in. For this reason elaborate precautions are taken throughout the manufacture of the ball bearings to insure that the completed product will be of the highest quality. Samples from almost every lot of bearings are run on a high speed test machine. A flaw in the surface of the races or the balls will produce an off sound that is easily audible at this high speed. From every lot of bearings that are heat treated, samples are taken and their fracture examined for grain structure. Chemical analysis, tensile strength, hardness and fatigue tests are run off periodically on the bearings to insure consistently excellent strength and durability.

These elaborate precautions and close tolerances have made ball bearings the highest precision instrument that has interchangeability.

THE CORNELL ENGINEER





Courtesy of Scaife Company

## Birth of a "blitz-bundle" . . .

Here's how the metal nose of an aerial bomb is formed. A white-hot metal tube, whirling rapidly in a chuck, is brought into contact with a spinning roller. Remotely-controlled movement of this forming roller gradually molds the tube-end into the required rounded contour.

Throughout this forming operation, the tube must be held at uniform temperature — high enough to keep the metal in a plastic condition. Ordinarily, the mass of metal in the chuck

tends to draw heat away from the bomb. However, by using Airco oxy-acetylene flame torches for supplementary heating, the spinning bomb is kept at a high, constant temperature, which facilitates forming and helps assure uniform wall thickness in the business end of the bomb.

This is only one of many ways in which the oxyacetylene flame is speeding wartime metal-working. It also shape cuts steel, cleans it, softens it, hardens its wearing surfaces, and

welds it and other metals into strong, one-piece parts. Teamed with the electric arc this versatile "tool" has blazed new short-cuts in metal fabrication . . . short-cuts that are pointing the way to better, stronger metal products for peacetime use.

If you would like to receive our informative publication, "Airco in the News," we shall be glad to send a free copy. Write to Mr. G. Van Alstyne, Dept. C. P., Air Reduction, 60 East 42nd Street, New York 17, N.Y.

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OXYGEN, ACETYLENE AND OTHER ATMOSPHERIC GASES • GAS WELDING AND CUTTING APPARATUS • CALCIUM CARBIDE  
ARC WELDING MACHINES AND SUPPLIES • CARBON DIOXIDE • "DRY ICE" • ANAESTHETIC AND THERAPEUTIC GASES AND APPARATUS

# STRESS *and* STRAIN...

There they were, under the klieg lights in front of Risley. No words broke the stillness. Stifling a yawn, she said.

"Dear, if you had money, what would you do?"

"Why, I'd travel."

He felt her small hand slip into his. He closed his eyes and sighed happily. When he looked up again, she had gone.

In his hand lay a dime.

\* \* \*

Then there was the little farm girl who came to Cornell because the farm hands were too rough.

\* \* \*

An EE, wending his way to the Dartmouth tussle, was well equipped with the last bottle of Scotch in the house. Just outside of Schoellkopf, he slipped and fell. On rising, he felt something wet running down his leg.

"I hope it's blood!" he said.

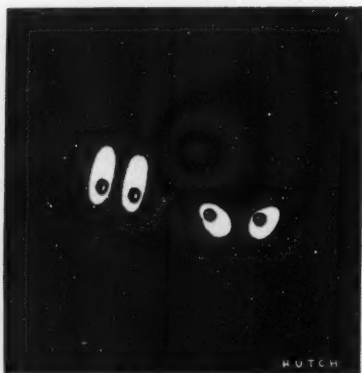
\* \* \*

The meanest fellow in the world is the one who runs through Goldwin-Smith Saturday nites with a flashlight.

\* \* \*

At a recent lunch club session: "I am sure that Mr. R. of the Fertilizer course will give you a very pleasant half hour. He is just full of his subject."

**Ya know, I haven't seen a woman for two years.**



A Cornell Grad '10 knocked at the door of a student's room.

"May I come in?" he asked. "It's the room I had when I was in college."

"Yes sir," he said, lost in reverie. "Same old room. Same old windows. Same old view of the campus. Same old closet."

The grad opened the door. There stood a girl much embarrassed.

"My sister," mumbled the student.

"Yes sir. Same old story!"

\* \* \*

Mary had a little lamb,  
Some salad, and dessert;  
Then gave the Chief the wrong  
address,  
The dirty little flirt!

\* \* \*

An inmate of the lunatic asylum was to be examined for dismissal. The first question he was asked was: "What are you going to do when you get out of here?"

The inmate replied, "I'm going to get me a sling shot and come back and break every damn window in this place."

After another six months in the padded cell, he was again examined and the same question was put to him.

"Well, I'm going to get a job," was the reply.

"Fine," said the examiner. "And then what?"

"Then I'm going to buy a big car."

"Good."

"And then I'm going to meet a beautiful girl."

"That's wonderful."

"Then I'm going to take her out driving on a lonely road."

"Yes."

"And I'm going to put my arm around the girl."

"Yes."

"Then I'm going to grab her garter, make a sling shot, and come back here and break every damn window in the place."

—Excavating Engineer

If it's funny enough to tell, it's been told;

If it hasn't been told, it's too clean; and

If it's dirty enough to interest an engineer

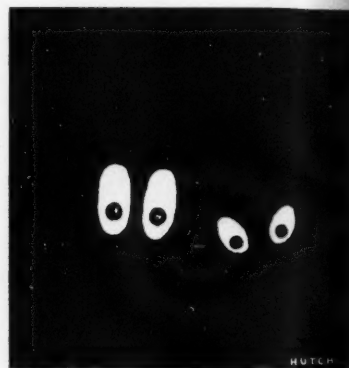
The editor gets kicked out of school.

\* \* \*

"Mother, papa wouldn't murder anybody, would he?"

"Certainly not, my child! What makes you ask that?"

"Well, I just heard him in the cellar saying, 'Let's kill these other two, George.'"



**Omigosh! I forgot to sign out**

One of our friends from Comstock was worrying on registration day whether she should try to get into courses with men in them, or to take easy courses. Finally she decided to follow a V-12 schedule.

\* \* \*

How easy it is the night before to get up early the next morning.

\* \* \*

The day after the fourth successful try, the clerk at Local Board 495 was filling out the routine registration form.

"Do you belong," she asked the young fellow at the desk, "to the Nazi Bund, or to any political party that plans to overthrow the government?"

"Yes, ma'am."

"Which one?" asked the clerk, obviously taken back by the registrant's placid candor.

"The Republican," was the earnest reply.

**THE CORNELL ENGINEER**

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